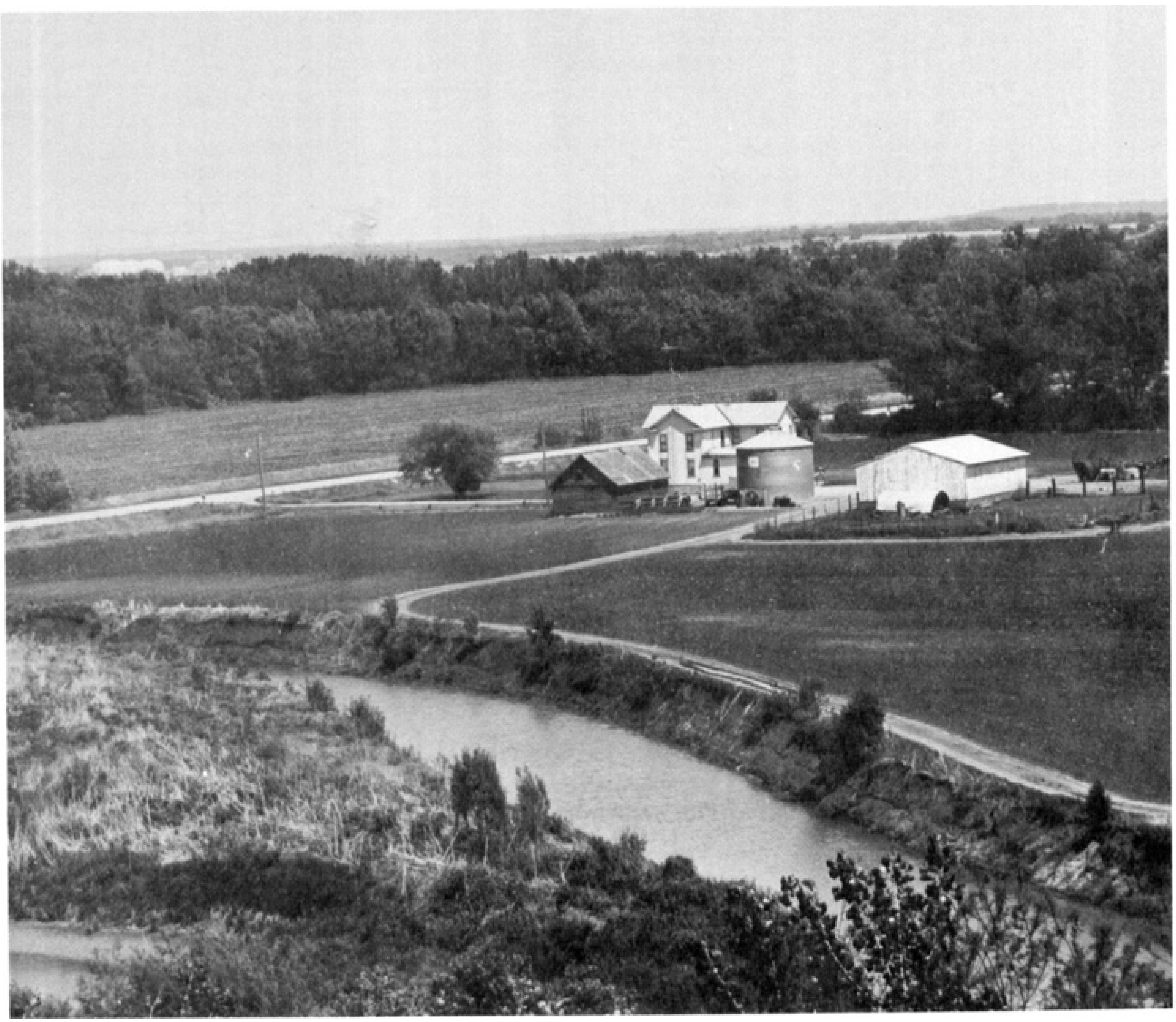
United States Department of Agriculture

Soil Conservation Service

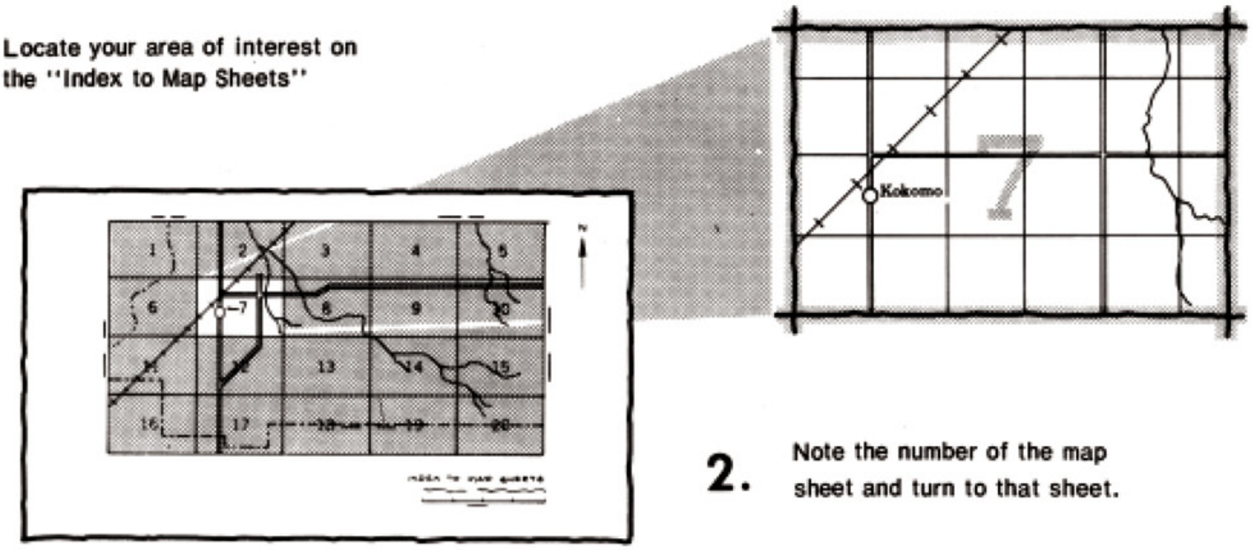
In cooperation with Iowa Agriculture and Home Economics Experiment Station; Cooperative Extension Service, Iowa State University; and Department of Soil Conservation, State of Iowa

Soil Survey of Louisa County, Iowa



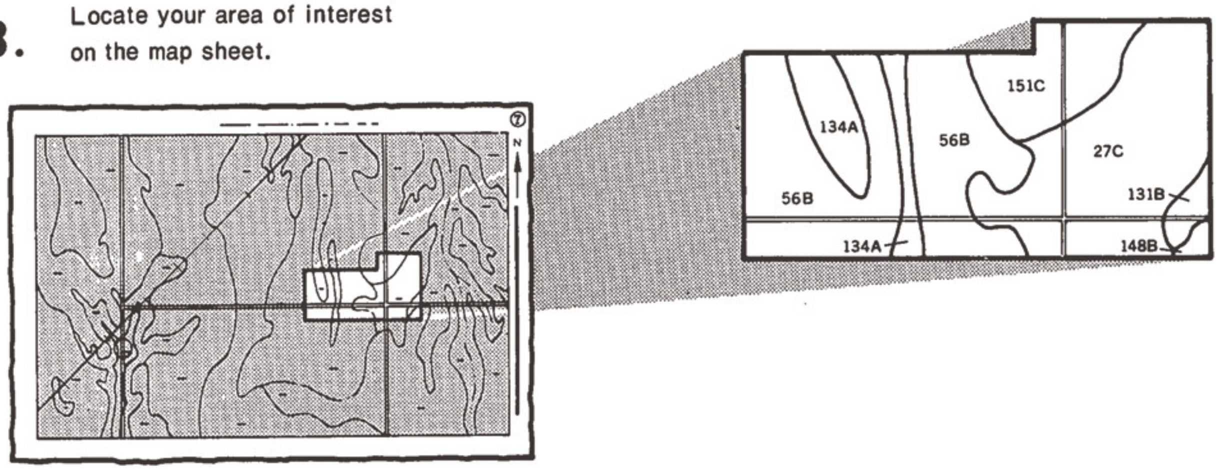
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets"

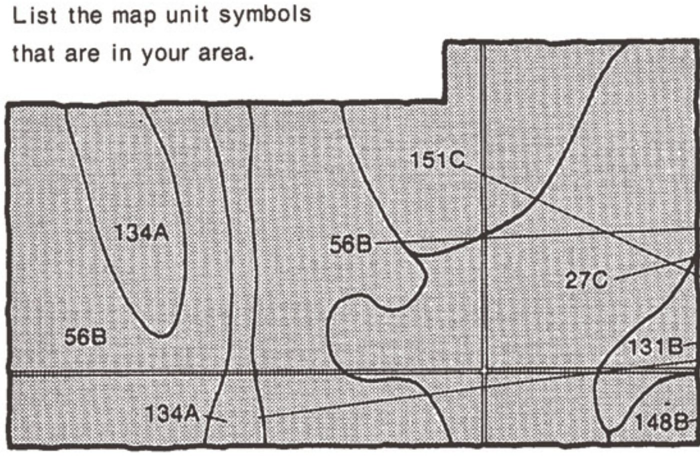


2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



4. List the map unit symbols that are in your area.



Symbols

27C
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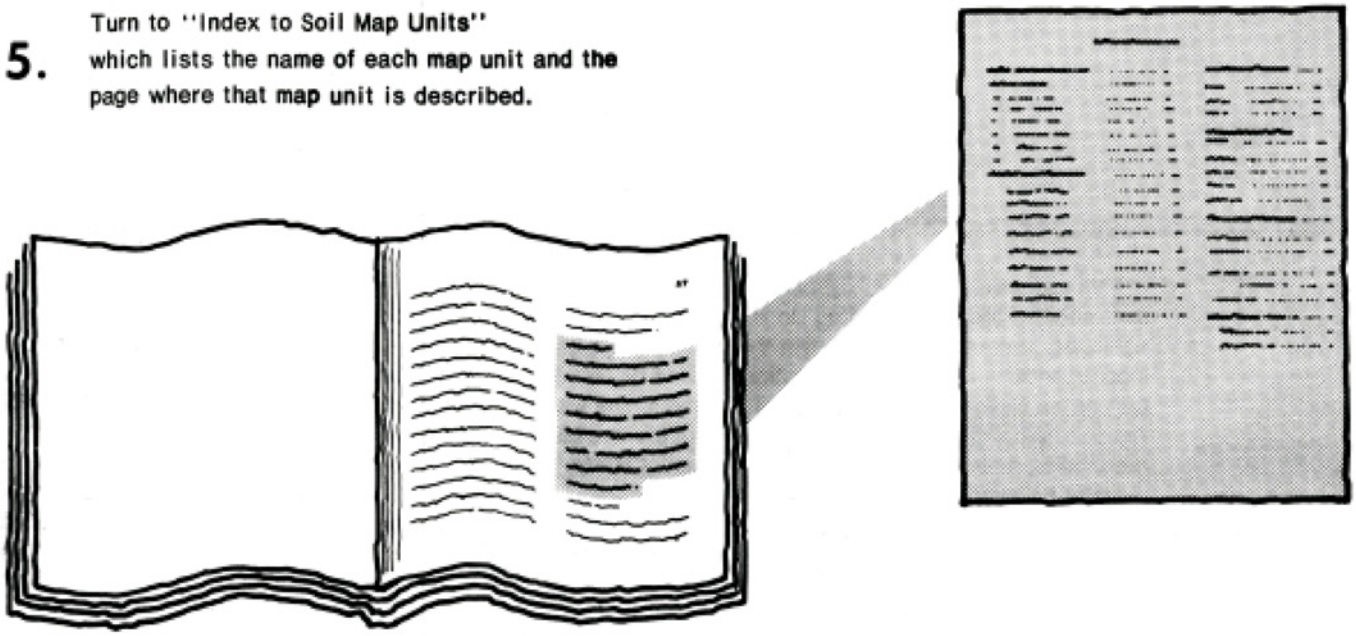
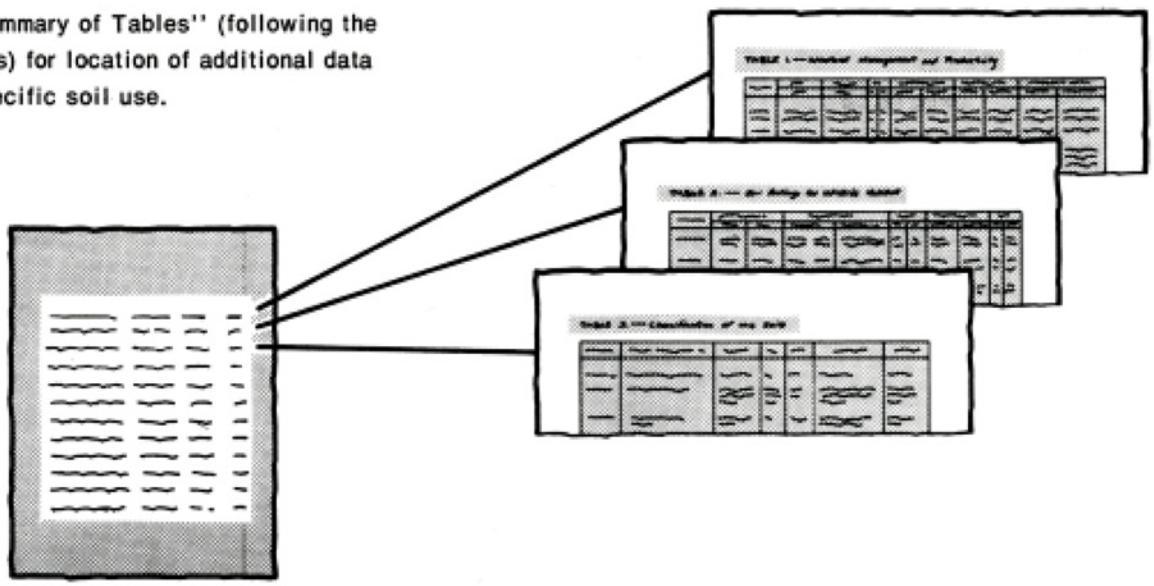
THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, handicap, or age.

Major fieldwork for this soil survey was completed in 1983. Soil names and descriptions were approved in 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1983. This survey was made cooperatively by the Soil Conservation Service; the Iowa Agriculture and Home Economics Experiment Station; the Cooperative Extension Service, Iowa State University; and the Department of Soil Conservation, State of Iowa. It is part of the technical assistance furnished to the Louisa County Soil Conservation District. Funds appropriated by Louisa County were used to defray part of the cost of the survey.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: An area of the Ambraw-Shaffton-Nodaway soil association. The large drainage ditch in the foreground leads to a pumping sation near the Mississippi River.

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Soil Series

Issued February 1988

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Summary of Tables

Preface

This soil survey contains information that can be used in land-planning programs in Louisa County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Soil Survey of Louisa County, Iowa

By Melvin D. Brown, Soil Conservation Service

Fieldwork by Thomas E. Brantmeier, Melvin D. Brown, Bennie Clark, Jr., and Richard A. Lensch, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service,
in cooperation with
the Iowa Agriculture and Home Economics Experiment Station;
the Cooperative Extension Service, Iowa State University;
and the Department of Soil Conservation, State of Iowa

LOUISA COUNTY is in the southeastern part of Iowa (fig. 1). It is bordered on the east by the Mississippi River. It has an area of about 418 square miles, or 267,520 acres, of which 9,600 acres is water. Wapello is the county seat.

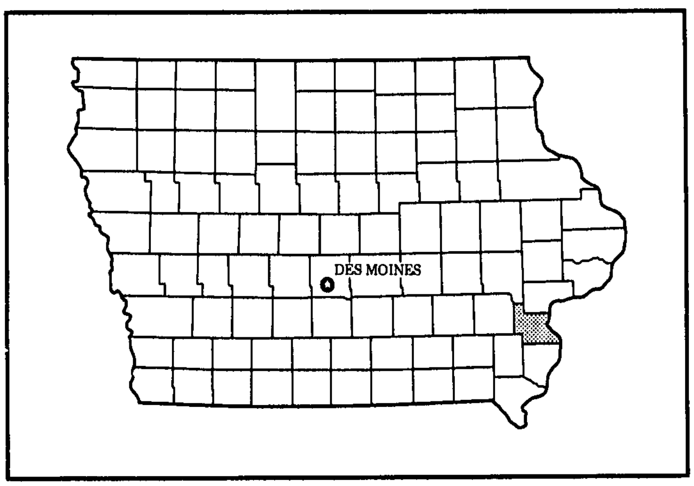

Figure 1.—Location of Louisa County in Iowa.

The county is almost entirely agricultural. Some areas on bottom land are wooded. In 1970, about 65 percent of the acreage was cropland; 16 percent, woodland; 10 percent, pasture and other agricultural land; 5 percent, urban and built-up land; and 3 percent, federal land. Corn and soybeans are the chief grain crops. Feeding beef cattle and raising hogs are the principal livestock enterprises.

The county is on loess-covered glacial till plains. Most of the soils on uplands formed in loess under prairie and forest vegetation. In the steeper areas, however, they formed in glacial till under a native vegetation of trees. The soils on the dominantly nearly level to gently sloping stream terraces and bottom land along the Mississippi and Iowa Rivers formed in alluvium.

This soil survey updates the survey of Louisa County published in 1921 (*3*). It provides additional information and larger maps, which show the soils in greater detail.

General Nature of the County

This section provides general information about the county. It briefly describes physiography and drainage, history and development, agriculture, transportation facilities, and climate.

Physiography and Drainage

Louisa County consists mainly of upland plains, which make up about 62 percent of the total acreage; stream terraces, which make up 15 percent; and low bottom land, which makes up 23 percent. The basin of the Mississippi River is a lowland belt along the eastern

boundary of the county. Another lowland belt follows the course of the Iowa River, which flows from northwest to southeast. This belt separates two areas of upland plains.

The highest point in the county, about 800 feet above sea level, is in the southeastern part of Morning Sun Township. The lowest elevation, 528 feet above sea level, is in the flood pool of the Mississippi River, in an area of the southeast corner where the river leaves the county.

The bottom land along the Mississippi River is about 5 miles wide at the northern boundary of the county. It gradually narrows to 1.5 to 2.0 miles toward the south and in township 74 N. It then increases to about 5 miles wide and remains at that width to the southern boundary.

A remnant of an old stream terrace, known as the Great Sand Mound, extends into the county from Muscatine County. It makes up about 1.5 square miles. Except for this terrace and another much smaller related area, practically all of the bottom land along the Mississippi River would be subject to overflow were it not for a system of levees along the river. Because of the levees and dug ditches, most of the bottom land can be cultivated.

Numerous sloughs are throughout this bottom land. The largest of these is known as Muscatine Slough, which extends into the county from the north and empties into the Mississippi River via a pumping station 1 mile east of Klum Lake. Ditches have drained the areas known as Klum Lake and Lake Odessa, the former a lagoon connecting with the Muscatine Slough and the latter an enlargement of that slough.

The bottom land between the Iowa and Mississippi Rivers, near Oakville, is drained to the south by a pumping station in Des Moines County. This area generally is gently undulating to level. The bottom land along the Iowa River ranges from 2 to 6 miles in width. It generally is nearly level. Most of the stream terraces rise abruptly about 20 feet above the bottom land. In some areas, however, the transition from the bottom land to the stream terrace is gradual.

The eastern upland plain is about 9 miles wide on the northern boundary. It gradually narrows to 2 miles in an area northeast of Wapello. From there, it is a narrow area projecting about 8 miles to the southeast. The bluffs on the eastern border of this gently rolling plain rise sharply 100 to 150 feet above the surrounding area, whereas those on the west are 40 to 90 feet high and have gentler, longer slopes. Some areas of this plain are underlain by sand, and some have a distinct dunelike appearance, rising 10 to 30 feet higher than the surrounding upland.

The western plain makes up the entire southwestern part of the county. The soils in this area contain more clay in the subsoil than the soils on the eastern plain. A prominent ridge in Morning Sun and Marshall Townships extends generally north and south. It is 30 feet above the rest of the upland plain. In the western part of the county, a very wide depressional area coincides with the drainage course of Long Creek.

Nearly all of the eastern upland plain is drained by the Iowa River. An area 12 square miles in size, however, is drained by short gulches and ravines. This area has only two streams of any length. These streams are in Grandview Township. The larger one is known as Whiskey Run. The western slope of this plain is drained by longer watercourses or creeks, the largest of which is Indian Creek.

Most of the western upland plain is drained by the Iowa River. The southwestern part of Morning Sun Township and the southwest corner of Elm Grove Township, however, are drained by a watershed in Henry County. The streams in the southern tier of townships flow in a northerly direction, whereas those in the rest of the county flow in an easterly direction. Some widely scattered sinkholes are throughout the county.

History and Development

The first permanent settlement in the area now known as Louisa County was established in 1832, near the mouth of the Iowa River. The early settlers came mostly by boat on the Mississippi and Iowa Rivers. Most of them settled on the edge of the forest, where the sod was more easily broken, where fuel and building material were available, and where there was protection from the fires that swept the prairie.

When it was established on December 7, 1836, the county was still part of the Wisconsin Territory. It was separated from the original Des Moines County, which was divided into seven counties.

The population of Louisa County was 4,939 in 1850 and 10,805 in 1860. In 1910, it was 12,855, which is 800 more than the 1981 census has shown.

Wapello, which had a population of 2,011 in 1970, is the largest town and has always been the county seat. Columbus Junction is the second largest town. It has a population of 1,429. Morning Sun, Letts, Oakville, Grandview, Columbus City, and Fredonia have populations of 959, 473, 470, 473, 367, and 224 respectively. Cotter, Toolesboro, Wyman, Cairo, Newport, Marsh, and Elrick are smaller towns.

Agriculture

Agriculture is of prime importance to the economy of Louisa County. It provides a livelihood not only for farmers but also to those engaged in many agriculture-related businesses. Farming expenses make a significant contribution to the economy. They include the cost of feed, seed, fertilizer, chemicals, fuel, oil, machinery, tools, hardware, repair items, and other products, most or all of which are sold locally. Oakville and Wapello are major exporting centers of grain.

Corn and soybeans are the main row crops. Truck crops, such as tomatoes, melons, potatoes, and sweet corn, are grown in northeastern and northwestern parts of the county. Livestock production is becoming more specialized as more of the farmers in the county raise only one class of livestock. In recent years the number of confinement livestock systems, primarily in swine production, has increased.

The farms in Louisa County, like those throughout the Midwest, have been increasing in size and decreasing in number. The number of farms decreased from 1,371 in 1920 to 1,061 in 1963 and 730 in 1978 (*17*). The average size increased from 162 acres in 1920 to 222 acres in 1963 and 324 acres in 1978. About half of the farms are owner operated. About 25 percent of the people in the county live on farms.

Transportation Facilities

The major transportation routes in Louisa County are U.S. Highway 61 and State Highways 99, 78, and 92. These routes are connected to all parts of the county by concrete or crushed-rock roads. Most farmsteads are along all-weather roads. One major bus company makes a stop in Wapello. The Mississippi River provides access to markets for agricultural products.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Louisa County is cold in winter and quite hot in summer. Summer is characterized by occasional cool spells. During winter, precipitation frequently occurs as snowstorms. It occurs chiefly as showers during the warmer months, when warm, moist air moves in from the south. The total annual rainfall is normally adequate for corn, soybeans, and small grain.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Columbus Junction in the period 1951 to 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 25 degrees F, and the average daily minimum temperature is 16 degrees. The lowest temperature on record, which occurred at Columbus Junction on January 14, 1957, is -25 degrees. In summer the average temperature is 73 degrees, and the average daily maximum temperature is 85 degrees. The highest recorded temperature, which occurred at Columbus Junction on July 28, 1955, is 103 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 36.88 inches. Of this, about 25 inches, or nearly 70 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 5.64 inches at Columbus Junction on August 30, 1965. Thunderstorms occur on about 48 days each year.

The average seasonal snowfall is about 37 inches. The greatest snow depth at any one time during the period of record was 27 inches. On the average, 36 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 65 percent of the time possible in summer and 40 percent in winter. The prevailing wind is from the west-northwest. Average windspeed is highest, 12 miles per hour, in the spring.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil

profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

Areas Dominated by Gently Sloping to Very Steep, Well Drained and Moderately Well Drained, Silty and Loamy Soils

These soils make up about 31 percent of the county. They are the Clinton, Downs, and Fayette soils, which formed in loess, and the Lindley soils, which formed in glacial till.

The gently sloping soils are well suited to cultivated crops. The steep and very steep soils are poorly suited to cultivated crops and are better suited to pasture and trees. The principal management concerns are controlling erosion, improving fertility, and maintaining tilth. The less sloping soils are well suited to terracing, farming on the contour, and stripcropping. Returning crop residue to the soil or regularly adding other organic material to the surface layer improve fertility and tilth and increase the rate of water infiltration.

1. Clinton-Lindley Association

Gently sloping to very steep, moderately well drained and well drained, silty and loamy soils that formed in loess and glacial till on uplands

This association consists of soils on narrow, rounded ridgetops and on side slopes. It has a well defined network of drainageways. Slopes range from 2 to 40 percent.

This association makes up about 19 percent of the county. It is about 50 percent Clinton soils, 25 percent Lindley soils, and 25 percent soils of minor extent (fig. 2).

Clinton soils are moderately well drained and are gently sloping to strongly sloping. They are on ridgetops and side slopes. Lindley soils are well drained and are strongly sloping to very steep. They are on side slopes.

Typically, the surface layer of the Clinton soils is dark grayish brown, friable silt loam about 9 inches thick. The subsoil to a depth of about 60 inches is friable and firm silty clay loam. The upper part is dark yellowish brown and yellowish brown, the next part is yellowish brown and mottled, and the lower part is light olive brown and mottled.

Typically, the surface layer of the Lindley soils is very dark grayish brown, friable loam about 4 inches thick. The subsurface layer is dark grayish brown and brown, friable loam about 5 inches thick. The subsoil is about 41 inches thick. The upper part is yellowish brown, mottled, friable loam, and the lower part is yellowish brown and strong brown, mottled, firm clay loam. The substratum to a depth of about 60 inches is strong brown and grayish brown, mottled loam.

The minor soils in this association are the Ashgrove, Inton, Keomah, Keswick, Klum, and Nodaway soils. Ashgrove and Inton soils are on side slopes. Ashgrove soils are poorly drained. Inton soils are grayer in the subsoil than the major soils. Keomah soils are somewhat poorly drained and are on ridgetops. Keswick soils are redder in the subsoil than the major soils. They are on side slopes. Klum and Nodaway soils are stratified and are on bottom land.

Most of the less sloping areas in this association are used for cultivated crops. The more sloping areas are used as permanent pasture or are wooded. The main enterprises are the production of corn and soybeans for cash and the feeding of beef cattle and hogs. The number of farms is decreasing, and many farmsteads are abandoned. The main management concerns are controlling erosion and maintaining or improving fertility and tilth.

2. Downs-Fayette Association

Gently sloping to steep, well drained, silty soils that formed in loess on uplands

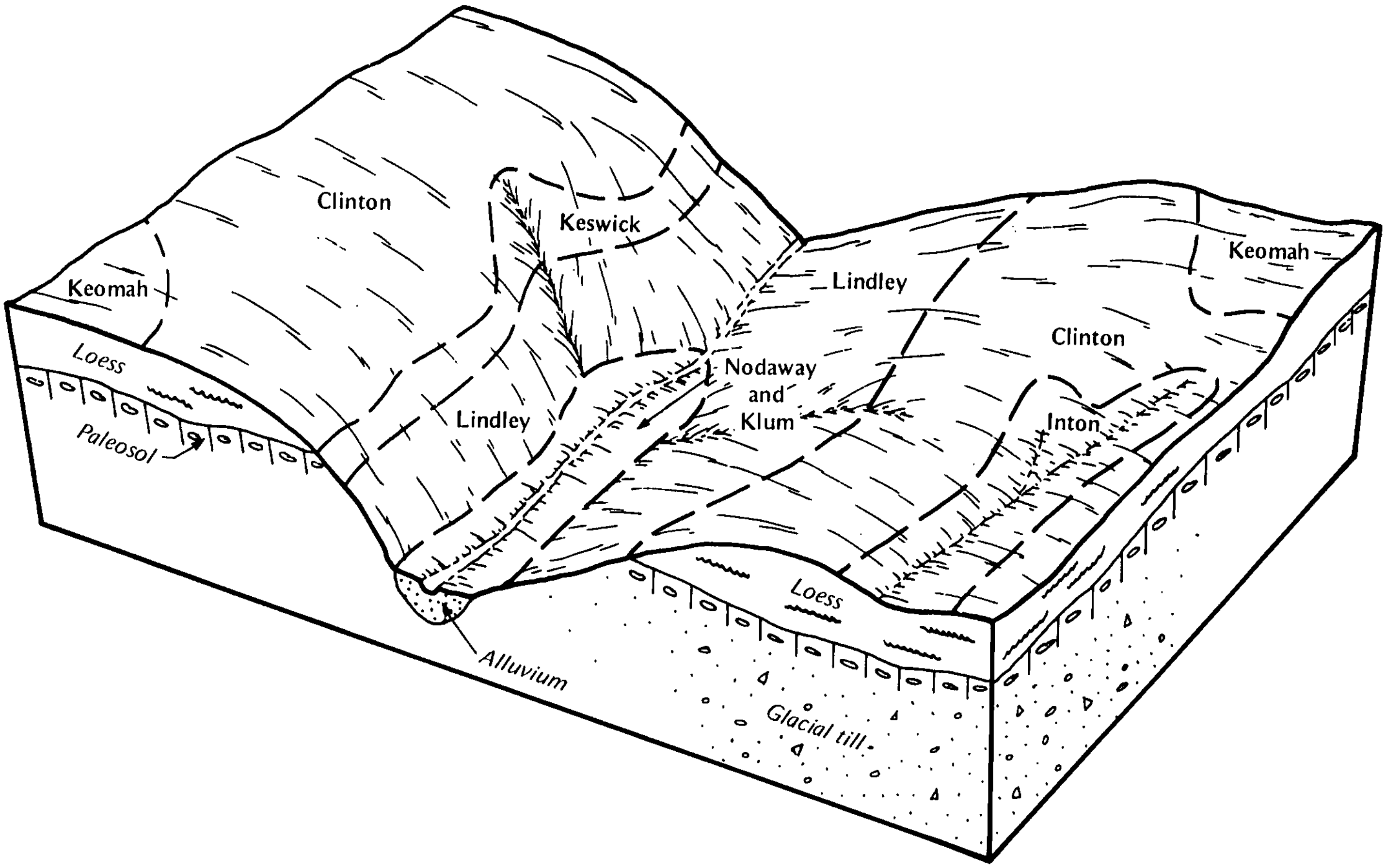

Figure 2.—Pattern of soils and parent material in the Clinton-Lindley association.

This association consists of soils on narrow ridgetops and on side slopes. It has a well defined network of drainageways. Slopes range from 2 to 25 percent.

This association makes up about 12 percent of the county. It is about 30 percent Downs soils, 28 percent Fayette soils, and 42 percent soils of minor extent (fig. 3).

Downs soils are gently sloping to strongly sloping. Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsoil to a depth of about 60 inches is friable silty clay loam. The upper part is dark yellowish brown and yellowish brown, and the lower part is yellowish brown and mottled.

Fayette soils are gently sloping to steep. Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is brown, friable silt loam about 3 inches thick. The subsoil to a depth of about 60 inches is friable silty clay loam. The upper part is yellowish brown, and the lower part is yellowish brown and mottled.

The minor soils in this association are the Douds, Inton, Lindley, Tama, Tell, and Whittier soils. Douds soils formed in loamy and sandy sediments on the lower side slopes. Inton soils are grayer than the major soils and contain less clay. They are in upland coves. Lindley soils formed in glacial till on the lower part of the side slopes. Tama, Tell, and Whittier soils are on ridgetops and side slopes. Tama soils have a surface layer that is darker or thicker than that of the major soils. Tell and Whittier soils are sand or loamy sand at a depth of 24 to 40 inches.

Most of the strongly sloping to steep areas of this association are used as permanent pasture or are wooded. Most of the gently sloping and moderately sloping areas are used for cultivated crops. The main enterprises are the production of corn and soybeans for cash and the feeding of beef cattle and hogs. The main management concerns are controlling erosion and maintaining or improving fertility and tilth.

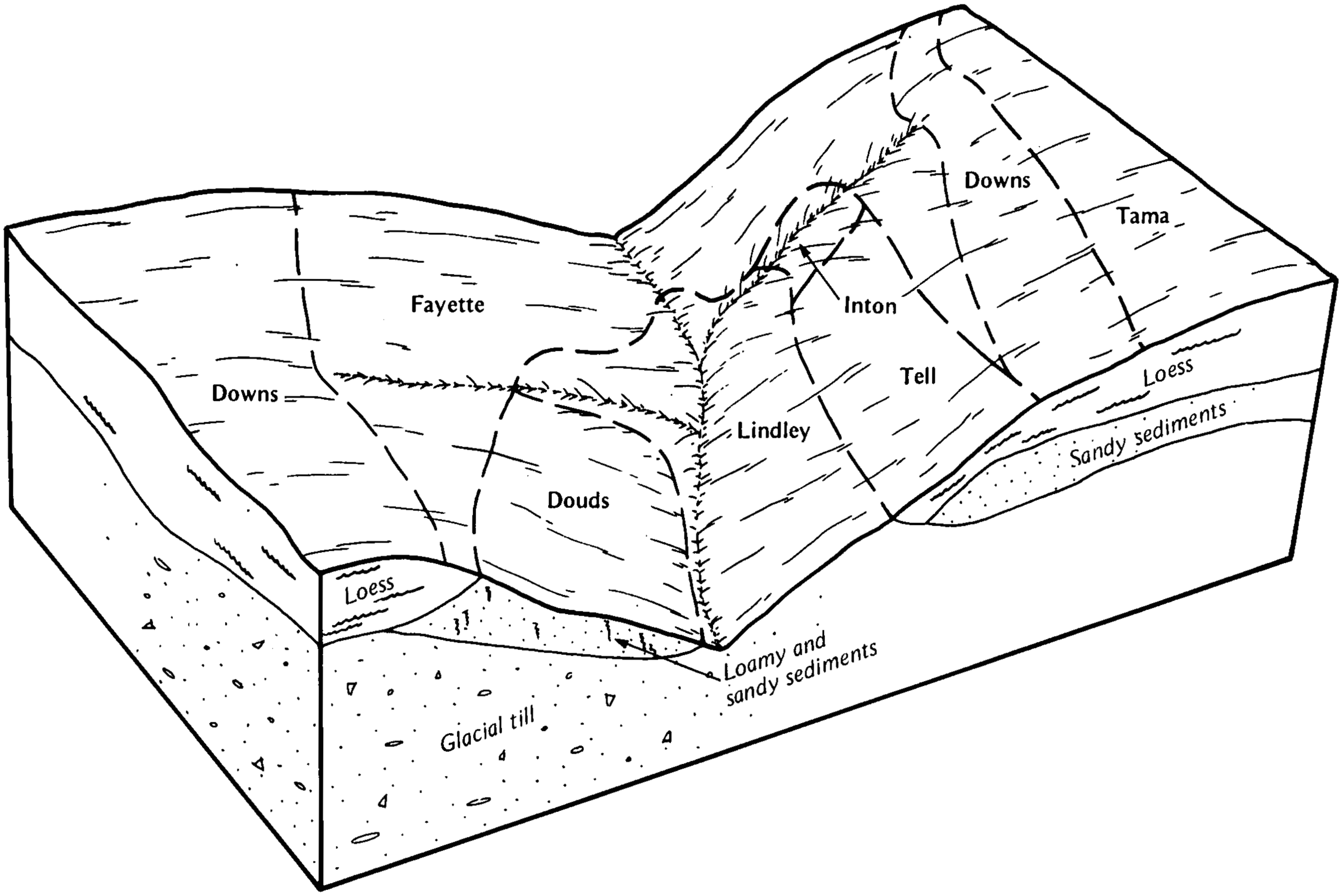

Figure 3.—Pattern of soils and parent material in the Downs-Fayette association.

Areas Dominated by Nearly Level to Gently Sloping, Somewhat Poorly Drained and Poorly Drained, Silty Soils

These soils make up about 14 percent of the county. They formed in loess. They are well suited to cultivated crops. The main management concerns are improving drainage, maintaining tilth and fertility, and controlling wind erosion. Subsurface drains improve the timeliness of fieldwork on the poorly drained soils. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to maintain tilth.

3. Taintor-Mahaska Association

Nearly level to gently sloping, poorly drained and somewhat poorly drained, silty soils that formed in loess on uplands

This association consists of soils on wide or moderately wide ridgetops. It does not have a well defined network of drainageways. Slopes range from 0 to 5 percent.

This association makes up about 8 percent of the county. It is about 51 percent Taintor soils, 20 percent Mahaska soils, and 29 percent soils of minor extent (fig. 4).

Taintor soils are poorly drained and nearly level. Mahaska soils are somewhat poorly drained and are nearly level and gently sloping.

Typically, the surface layer of the Taintor soils is black, friable silty clay loam about 8 inches thick. The subsurface layer is black and very dark gray, mottled silty clay loam about 15 inches thick. The upper part is friable, and the lower part is firm. The subsoil is olive gray, mottled, firm silty clay loam about 27 inches thick. The substratum to a depth of about 60 inches is olive gray, mottled silty clay loam.

Typically, the surface layer of the Mahaska soils is black, friable silty clay loam about 8 inches thick. The

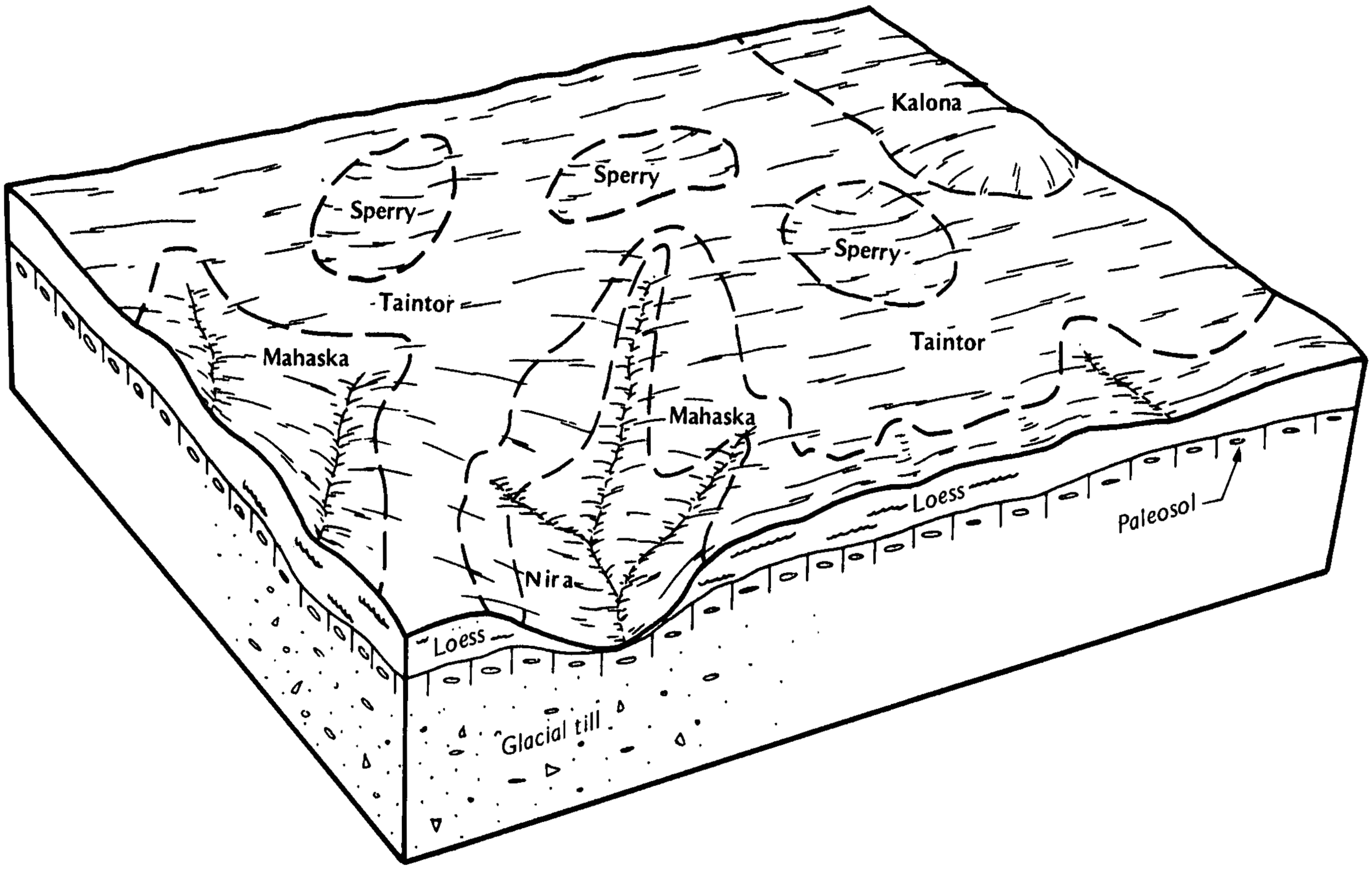

Figure 4.—Pattern of soils and parent material in the Taintor-Mahaska association.

subsurface layer is very dark gray and very dark grayish brown, friable silty clay loam about 11 inches thick. The subsoil to a depth of about 60 inches is mottled silty clay loam. It is dark grayish brown and firm in the upper part and grayish brown and friable in the lower part.

The minor soils in this association are the Colo, Kalona, Nira, Otley, and Sperry soils. Colo soils are in drainageways. Their surface layer is thicker than that of the major soils. Kalona soils are on broad upland divides. They have more clay in the surface layer than the major soils. The moderately well drained Nira and Otley soils are browner in the upper part of the subsoil than the major soils. Nira soils are on the upper parts of side slopes, and Otley soils are on ridges and convex side slopes. Sperry soils have more silt and less clay in the surface layer than the major soils and have more clay in the subsoil. They are in slightly depressional areas.

Almost all of the acreage is used for cultivated crops. Only a few areas are used as pasture. Most of the trees in areas of this association are in groves or windbreaks near farm buildings. The main enterprise is the production of corn and soybeans for cash. The main management concerns are improving drainage and maintaining tilth and fertility.

4. Atterberry-Muscatine-Stronghurst Association

Nearly level, somewhat poorly drained, silty soils that formed in loess on uplands

This association consists of soils on ridgetops. It has a well defined network of drainageways. Slopes range from 0 to 2 percent.

This association makes up about 6 percent of the county. It is about 29 percent Atterberry soils, 20 percent Muscatine soils, 14 percent Stronghurst soils, and 37 percent soils of minor extent.

Typically, the surface layer of the Atterberry soils is very dark gray, friable silt loam about 9 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 4 inches thick. The subsoil is mottled, friable silty clay loam about 38 inches thick. The upper part is dark yellowish brown and yellowish brown, and the lower part is light brownish gray. The substratum to a depth of

about 60 inches is mottled yellowish brown and light brownish gray silt loam.

Typically, the surface layer of the Muscatine soils is black, friable silty clay loam about 7 inches thick. The subsurface layer is very dark gray and very dark grayish brown, friable silty clay loam about 8 inches thick. The subsoil is mottled, friable silty clay loam about 36 inches thick. The upper part is dark grayish brown, and the lower part is grayish brown. The substratum to a depth of about 60 inches is grayish brown, mottled silty clay loam.

Typically, the surface layer of the Stronghurst soils is dark grayish brown, friable silt loam about 6 inches thick. The subsurface layer also is dark grayish brown, friable silt loam. It is about 8 inches thick. The subsoil is friable silty clay loam about 34 inches thick. The upper part is brown; the next part is grayish brown, brown, and yellowish brown and is mottled; and the lower part is light brownish gray and mottled. The substratum to a depth of about 60 inches is light brownish gray, mottled silt loam.

The minor soils in this association are the Garwin, Sperry, Traer, and Walford soils on ridgetops. Garwin, Traer, and Walford soils are poorly drained, and Sperry soils are very poorly drained.

Almost all of the acreage is used for cultivated crops. Most of the trees in areas of this association are in groves or windbreaks near farm buildings. The main enterprise is the production of corn and soybeans for cash. The main management concerns are improving drainage and maintaining tilth and fertility.

Areas Dominated by Nearly Level to Strongly Sloping, Moderately Well Drained and Somewhat Poorly Drained, Silty Soils

These soils make up about 19 percent of the county. They formed in loess. The gently sloping soils are well suited to cultivated crops, and the moderately sloping and strongly sloping soils are moderately suited. The main management concerns are improving drainage, controlling erosion, maintaining tilth, and improving fertility. Subsurface drains permit more timely fieldwork on the somewhat poorly drained soils. Contour farming, terraces, stripcropping, and a cropping sequence that includes not only row crops but also oats and hay help to control erosion. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to maintain tilth.

5. Ladoga-Hedrick-Givin Association

Nearly level to strongly sloping, moderately well drained and somewhat poorly drained, silty soils that formed in loess on uplands

This association consists of soils on moderately wide ridgetops and on side slopes. It has a well defined network of drainageways. Slopes range from 0 to 14 percent.

This association makes up about 13 percent of the county. It is about 24 percent Ladoga soils, 20 percent Hedrick soils, 10 percent Givin soils, and 46 percent soils of minor extent.

Ladoga soils are moderately well drained and are gently sloping to strongly sloping. They are on ridgetops and side slopes. Hedrick soils are moderately well drained and are gently sloping and moderately sloping. They are on side slopes. Givin soils are somewhat poorly drained and are nearly to gently sloping. They are on ridgetops.

Typically, the surface layer of the Ladoga soils is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is brown, friable silt loam about 3 inches thick. The subsoil is silty clay loam about 39 inches thick. The upper part is brown and friable, the next part is brown and dark yellowish brown and is firm, and the lower part is brown and grayish brown and is friable. The substratum to a depth of about 60 inches is grayish brown, brown, and yellowish brown, mottled silty clay loam.

Typically, the surface layer of the Hedrick soils is very dark grayish brown, friable silt loam about 9 inches thick. Plowing has mixed streaks and pockets of dark yellowish brown silty clay loam from the subsoil into the surface layer. The subsoil is mottled, friable silty clay loam about 43 inches thick. The upper part is dark yellowish brown, the next part is grayish brown, and the lower part is olive gray. The substratum to a depth of about 60 inches is light olive gray, mottled silty clay loam.

Typically, the surface layer of the Givin soils is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 3 inches thick. The subsoil is mottled, friable and firm silty clay loam about 42 inches thick. The upper part is brown and grayish brown, and the lower part is grayish brown and light olive brown. The substratum to a depth of about 60 inches is mottled yellowish brown and olive gray silty clay loam.

The minor soils in this association include the Colo, Gara, Rinda, and Rubio soils. The poorly drained Colo soils are in drainageways. The well drained Gara soils are on the lower parts of side slopes. The poorly drained Rinda soils are in coves at the head of drainageways. The poorly drained Rubio soils are on broad upland divides.

Most of the acreage is used for cultivated crops. Only the more sloping areas are used as permanent pasture. Most of the trees in areas of this association are in groves or windbreaks near farm buildings or along drainageways on the more sloping parts of the landscape. The main enterprises are the production of corn and soybeans for cash and the raising and feeding of hogs and beef cattle. The main management concerns are controlling erosion and maintaining or improving fertility and tilth.

6. Mahaska-Nira-Otley Association

Nearly level to moderately sloping, somewhat poorly drained and moderately well drained, silty soils that formed in loess on uplands

This association consists of soils on moderately wide or wide ridgetops and on somewhat short side slopes. It has a well defined network of drainageways. Slopes range from 0 to 9 percent.

This association makes up about 6 percent of the county. It is about 50 percent Mahaska soils, 20 percent Nira soils, 15 percent Otley soils, and 15 percent soils of minor extent (fig. 5).

Mahaska soils are somewhat poorly drained and are nearly level and gently sloping. They are on ridgetops and side slopes. Nira soils are moderately well drained and are gently sloping and moderately sloping. They are on side slopes. Otley soils are moderately well drained and are gently sloping and moderately sloping. They are on ridgetops and side slopes.

Typically, the surface layer of the Mahaska soils is black, friable silty clay loam about 8 inches thick. The subsurface layer is very dark gray and very dark grayish brown, friable silty clay loam about 11 inches thick. The subsoil to a depth of about 60 inches is mottled silty clay loam. It is dark grayish brown and firm in the upper part and grayish brown and friable in the lower part.

Typically, the surface layer of the Nira soils is very dark gray, friable silty clay loam about 7 inches thick. The subsurface layer also is very dark gray, friable silty clay loam. It is about 5 inches thick. The subsoil is mottled, friable silty clay loam about 36 inches thick. The upper part is brown, the next part is grayish brown, and the lower part is olive gray. The substratum to a depth of about 60 inches is light olive gray, mottled silty clay loam.

Typically, the surface layer of the Otley soils is black, friable silty clay loam about 8 inches thick. The subsurface layer is very dark brown and very dark grayish brown, friable silty clay loam about 10 inches

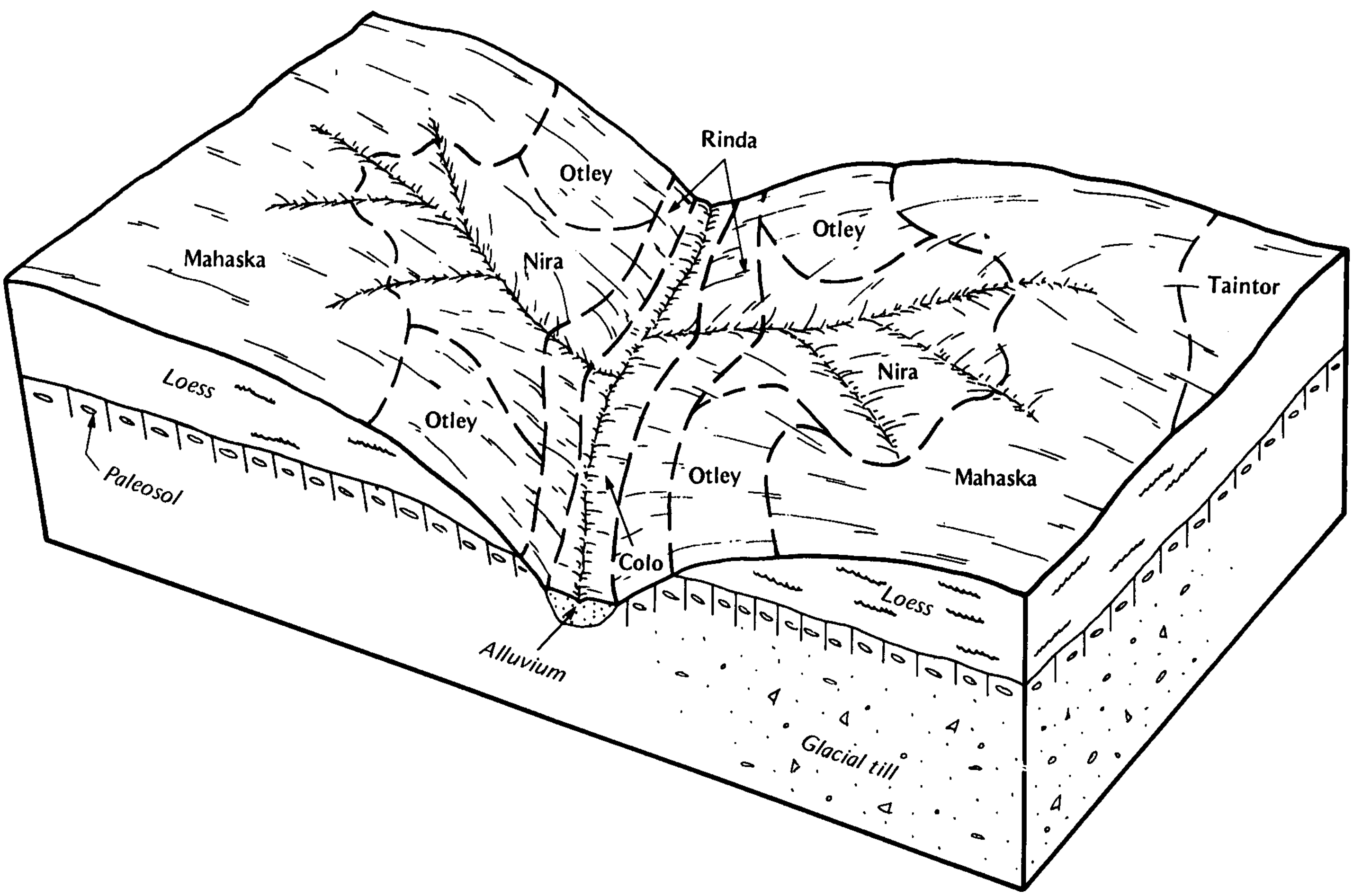

Figure 5.—Pattern of soils and parent material in the Mahaska-Nira-Otley association.

thick. The subsoil to a depth of about 60 inches is mottled, friable and firm silty clay loam. The upper part is dark yellowish brown, and the lower part is yellowish brown.

The minor soils in this association are the Colo, Rinda, Sperry, and Taintor soils. The poorly drained Colo soils are in drainageways. The poorly drained Rinda soils are in coves at the head of drainageways and on the lower parts of side slopes. The very poorly drained Sperry soils are in slightly depressional areas. The poorly drained Taintor soils are on broad upland divides.

Most of the acreage is used for cultivated crops. A few of the more sloping areas are used as pasture. Most of the trees in areas of this association are in groves or windbreaks near farm buildings. The main enterprises are the production of corn and soybeans for cash and the raising and feeding of hogs. The main management concerns are controlling erosion and maintaining tilth and fertility.

Areas Dominated by Nearly Level, Moderately Well Drained to Poorly Drained, Silty and Loamy Soils

These soils formed in alluvium on flood plains and low stream terraces along the major streams. They are subject to flooding. They make up about 18 percent of the county.

These soils are used for cultivated crops, hay, or pasture or are left idle. The flooding is a hazard, but some areas are protected by levees or drainage ditches. Many of the soils have a seasonal high water table. The principal management concerns are improving drainage, controlling flooding, and improving fertility. Subsurface drains function well in these soils if suitable outlets are available. Returning crop residue to the soil or regularly adding other organic material to the surface layer improves fertility.

7. Ambraw-Shaffton-Nodaway Association

Nearly level, poorly drained to moderately well drained, silty and loamy soils that formed in alluvium on bottom land

This association consists of soils on narrow or moderately wide flood plains along the major streams. Slopes range from 0 to 2 percent.

This association makes up about 13 percent of the county. It is about 25 percent Ambraw soils, 12 percent Shaffton soils, 14 percent Nodaway soils, and 49 percent soils of minor extent.

Ambraw soils are poorly drained. Typically, the surface layer is very dark gray, friable loam about 9 inches thick. The subsurface layer is black, friable loam about 10 inches thick. The subsoil is about 26 inches thick. The upper part is dark gray and dark grayish brown, mottled, friable loam, and the lower part is mottled dark gray and grayish brown, friable sandy loam. The substratum to a depth of about 60 inches is grayish brown loamy sand.

Shaffton soils are somewhat poorly drained. Typically, the surface layer is very dark grayish brown, friable loam about 11 inches thick. The subsurface layer is dark brown, friable loam about 8 inches thick. The subsoil is about 31 inches thick. It is brown and mottled. The upper part is friable loam, and the lower part is very friable sandy loam. The substratum to a depth of about 60 inches is stratified sand and loamy sand. It is brown in the upper part and mottled grayish brown and brown in the lower part.

Nodaway soils are moderately well drained. Typically, the surface layer is very dark grayish brown, friable silt loam about 7 inches thick. The substratum to a depth of about 60 inches is dark grayish brown, brown, light brownish gray, and very dark grayish brown, stratified silt loam.

The minor soils in this association are the Coland, Colo, Lawson, and Perks soils on the flood plains. Coland, Colo, and Lawson soils have a surface layer that is thicker than that of the major soils. Perks soils are excessively drained.

Most of this association is used for cultivated crops, hay, or pasture or is left idle. Areas adjacent to the Iowa and Cedar Rivers support native trees or scrub vegetation. Flooding commonly is a hazard, but some areas are partly protected by low levees and by drainage ditches. The main enterprises are the production of corn and soybeans for cash and the feeding of beef cattle and hogs. The main management concerns are controlling flooding and wind erosion and maintaining fertility.

8. Rowley-Tuskeego-Titus Association

Nearly level, somewhat poorly drained and poorly drained, silty soils that formed in alluvium on bottom land and low stream terraces

This association consists of soils on wide stream terraces and flood plains along the Iowa and Cedar Rivers. It has an extensive system of drainage ditches. This system protects most areas against flooding. Slopes range from 0 to 2 percent.

This association makes up about 5 percent of the county. It is about 20 percent Rowley soils, 19 percent Tuskeego soils, 16 percent Titus soils, and 45 percent soils of minor extent.

Rowley soils are somewhat poorly drained and are on low stream terraces. Titus and Tuskeego soils are poorly drained and are on bottom land.

Typically, the surface layer of the Rowley soils is black, friable silt loam about 8 inches thick. The subsurface layer is very dark gray and very dark grayish brown, friable silt loam about 15 inches thick. The subsoil extends to a depth of at least 60 inches. It is friable. The upper part is dark grayish brown, grayish brown, and yellowish brown, mottled silt loam; the next

part is grayish brown silt loam; and the lower part is grayish brown and olive gray, mottled silty clay loam.

Typically, the surface layer of the Tuskeego soils is very dark gray, friable silt loam about 9 inches thick. The subsurface layer is dark gray, mottled, friable silt loam about 8 inches thick. The subsoil to a depth of about 60 inches is mottled, firm silty clay loam and silty clay. The upper part is dark gray, and the lower part is grayish brown and light brownish gray.

Typically, the surface layer of the Titus soils is black, friable silty clay loam about 6 inches thick. The subsurface layer also is black, friable silty clay loam. It is about 14 inches thick. The subsoil to a depth of about 60 inches is silty clay loam. The upper part is dark gray, mottled, and firm, and the lower part is olive gray and is firm and friable.

The minor soils in this association are the Coppock, Dickinson, Koszta, Sparta, Wiota, and Zook soils. Coppock and Koszta soils contain less clay in the subsoil than the major soils. They are on terraces. The well drained Dickinson and Wiota and excessively drained Sparta soils are in the slightly higher areas on the terraces. Zook soils have a surface layer that is thicker and darker than that of the major soils. They are on flood plains.

Most of the acreage is used for cultivated crops. Only a few areas are pastured. Most of the trees in areas of this association are in groves or windbreaks near farmsteads. The soils generally are well suited or moderately suited to all of the cultivated crops commonly grown in the county. The main enterprise is the production of corn and soybeans for cash. The main management concerns are improving drainage, maintaining tilth and fertility, and controlling floodwater. Even though much of the association is subject to flooding, a drainage system has prevented flooding in most areas.

Areas Dominated by Nearly Level to Moderately Sloping, Excessively Drained, Well Drained, and Somewhat Poorly Drained, Sandy and Loamy Soils

These soils make up about 9 percent of the county. They formed in alluvium that has been reworked by the wind. They are poorly suited or moderately suited to cultivated crops. The principal management concerns are controlling wind erosion and improving fertility. Also, most of the soils are droughty. Returning crop residue to the soil or regularly adding other organic material improves fertility, increases the rate of water infiltration, and helps to control wind erosion.

9. Sparta-Dickinson-Hoopeston Association

Nearly level to moderately sloping, excessively drained, well drained, and somewhat poorly drained, loamy and sandy soils that formed in alluvium and sandy eolian material on stream terraces and on uplands

This association consists of soils on terraces and uplands along the Iowa and Cedar Rivers. Slopes range from 0 to 9 percent.

This association makes up about 9 percent of the county. It is about 27 percent Sparta soils, 15 percent Dickinson soils, 14 percent Hoopeston soils, and 44 percent soils of minor extent.

The excessively drained, nearly level to moderately sloping Sparta soils and the well drained, nearly level and gently sloping Dickinson soils are on stream terraces and on ridgetops and side slopes in the uplands. The somewhat poorly drained, nearly level Hoopeston soils are on stream terraces.

Typically, the surface layer of the Sparta soils is very dark brown, very friable sand about 10 inches thick. The subsurface layer is very dark grayish brown and dark brown, very friable sand about 14 inches thick. The subsoil is very friable sand about 20 inches thick. The upper part is dark brown, and the lower part is dark yellowish brown. The substratum to a depth of about 60 inches is brown fine sand.

Typically, the surface layer of the Dickinson soils is very dark brown, very friable fine sandy loam about 9 inches thick. The subsurface layer is very dark brown and very dark grayish brown, very friable fine sandy loam about 11 inches thick. The subsoil is very friable fine sandy loam about 18 inches thick. The upper part is dark brown, and the lower part is dark yellowish brown. The substratum to a depth of about 60 inches is yellowish brown fine sand.

Typically, the surface layer of the Hoopeston soils is very dark brown, friable loam about 9 inches thick. The subsurface layer is very dark grayish brown, friable loam about 8 inches thick. The subsoil is about 24 inches thick. It is mottled and very friable. The upper part is brown fine sandy loam, the next part is yellowish brown sandy loam, and the lower part is dark yellowish brown and yellowish brown loamy sand. The substratum to a depth of about 60 inches is multicolored sand.

The minor soils in this association are the Bertrand, Chelsea, Gilford, and Marshan soils on the stream terraces. Bertrand soils contain more clay and silt and less sand in the surface soil and subsoil than the major soils. Chelsea soils have a surface layer that is thinner and lighter colored than that of the major soils. Gilford and Marshan soils are poorly drained.

Most of this association is used for cultivated crops. The main enterprises are the production of corn and soybeans for cash and the feeding of beef cattle and hogs. The main management concerns are controlling wind erosion and maintaining tilth and fertility.

Areas Dominated by Nearly Level and Very Gently Sloping, Excessively Drained, Well Drained, and Poorly Drained, Silty, Loamy, and Sandy Soils

These soils make up about 9 percent of the county. They are on flood plains along the Mississippi River. Levees protect most areas against flooding.

These soils are well suited or moderately suited to cultivated crops. The principal management concerns are improving drainage, controlling floodwater, and maintaining tilth and fertility. Much of the association is drained by tile and drainage ditches leading to pumping stations, which move the water over the levees and into the river. Returning crop residue to the soil or regularly adding other organic material helps to maintain tilth and improves fertility.

10. Fruitfield-Elrick-Toolesboro Association

Nearly level and very gently sloping, excessively drained, well drained, and poorly drained, loamy and sandy soils that formed in alluvium on bottom land

This association consists of soils on flood plains between uplands and the Mississippi River. It lacks a well defined network of natural drainageways. The soils formed in iron-rich, reddish alluvial sediments of the Great Lakes region. Slopes range from 0 to 3 percent.

This association makes up about 3 percent of the county. It is about 24 percent Fruitfield soils, 21 percent Elrick soils, 19 percent Toolesboro soils, and 36 percent soils of minor extent.

Fruitfield soils are excessively drained and very gently sloping. Elrick soils are nearly level and well drained. Toolesboro soils are nearly level and poorly drained.

Typically, the surface layer of the Fruitfield soils is dark brown, very friable sand about 7 inches thick. The subsurface layer also is dark brown, very friable sand. It is about 13 inches thick. The next layer is brown, loose sand about 18 inches thick. The substratum to a depth of about 60 inches is multicolored coarse sand.

Typically, the surface layer of the Elrick soils is very dark grayish brown, very friable sandy loam about 10 inches thick. The subsurface layer is dark brown, very friable sandy loam about 4 inches thick. The subsoil is brown, very friable sandy loam about 14 inches thick. The upper part of the substratum is brown and dark brown loamy sand and sand. The lower part to a depth of about 60 inches is dark yellowish brown sand.

Typically, the surface layer of the Toolesboro soils is very dark grayish brown, friable loam about 9 inches thick. The subsurface layer is dark brown, friable loam about 4 inches thick. The subsoil is about 23 inches thick. It is mottled and very friable. The upper part is dark brown sandy loam, the next part is brown sandy loam, and the lower part is dark yellowish brown loamy sand. The substratum to a depth of about 60 inches is dark yellowish brown loamy sand.

The minor soils in this association are the Ambraw, Chelsea, Shaffton, and Sparta soils. Ambraw soils contain more clay in the upper part of the subsoil than the major soils. They are on flood plains. Chelsea and Sparta soils are excessively drained and are on stream terraces. Shaffton soils are somewhat poorly drained and are on flood plains.

Most areas of this association are used for corn, soybeans, wheat, or vegetable crops. Areas adjacent to the Mississippi River support native trees or scrub vegetation. Much of the association is subject to flooding, but the soils are protected by levees, a system of drainage ditches, and a pumping system. The minor soils on terraces are above the normal flood level. The main enterprise is the production of cash crops. The main management needs are irrigation and measures that control wind erosion and maintain tilth and fertility.

11. Titus-Ambraw-Colo Association

Nearly level, poorly drained, silty and loamy soils that formed in alluvium on bottom land

This association consists of soils on wide flood plains between uplands and the Mississippi River. It has an extensive system of drainage ditches and diversion ditches. Most areas are protected against flooding. Slopes range from 0 to 2 percent.

This association makes up about 6 percent of the county. It is about 36 percent Titus soils, 15 percent Ambraw soils, 10 percent Colo soils, and 39 percent soils of minor extent (fig. 6).

Typically, the surface layer of the Titus soils is black, friable silty clay loam about 6 inches thick. The subsurface layer also is black, friable silty clay loam. It is about 14 inches thick. The subsoil to a depth of about 60 inches is silty clay loam. The upper part is dark gray, mottled, and firm, and the lower part is olive gray and is firm and friable.

Typically, the surface layer of the Ambraw soils is very dark gray, friable loam about 9 inches thick. The subsurface layer is black, friable loam about 10 inches thick. The subsoil is about 26 inches thick. The upper part is dark gray and dark grayish brown, mottled, friable loam, and the lower part is mottled dark gray and grayish brown, friable sandy loam. The substratum to a depth of about 60 inches is grayish brown loamy sand.

Typically, the surface layer of the Colo soils is black, friable silty clay loam about 8 inches thick. The subsurface layer is black and very dark gray, mottled, friable silty clay loam about 41 inches thick. The subsoil to a depth of about 60 inches is gray, friable silty clay loam.

The minor soils in this association include the Perks, Shaffton, and Zook soils on flood plains. Perks soils are excessively drained. Shaffton soils are somewhat poorly drained. Zook soils are poorly drained. Their surface layer is thicker that that of the major soils.

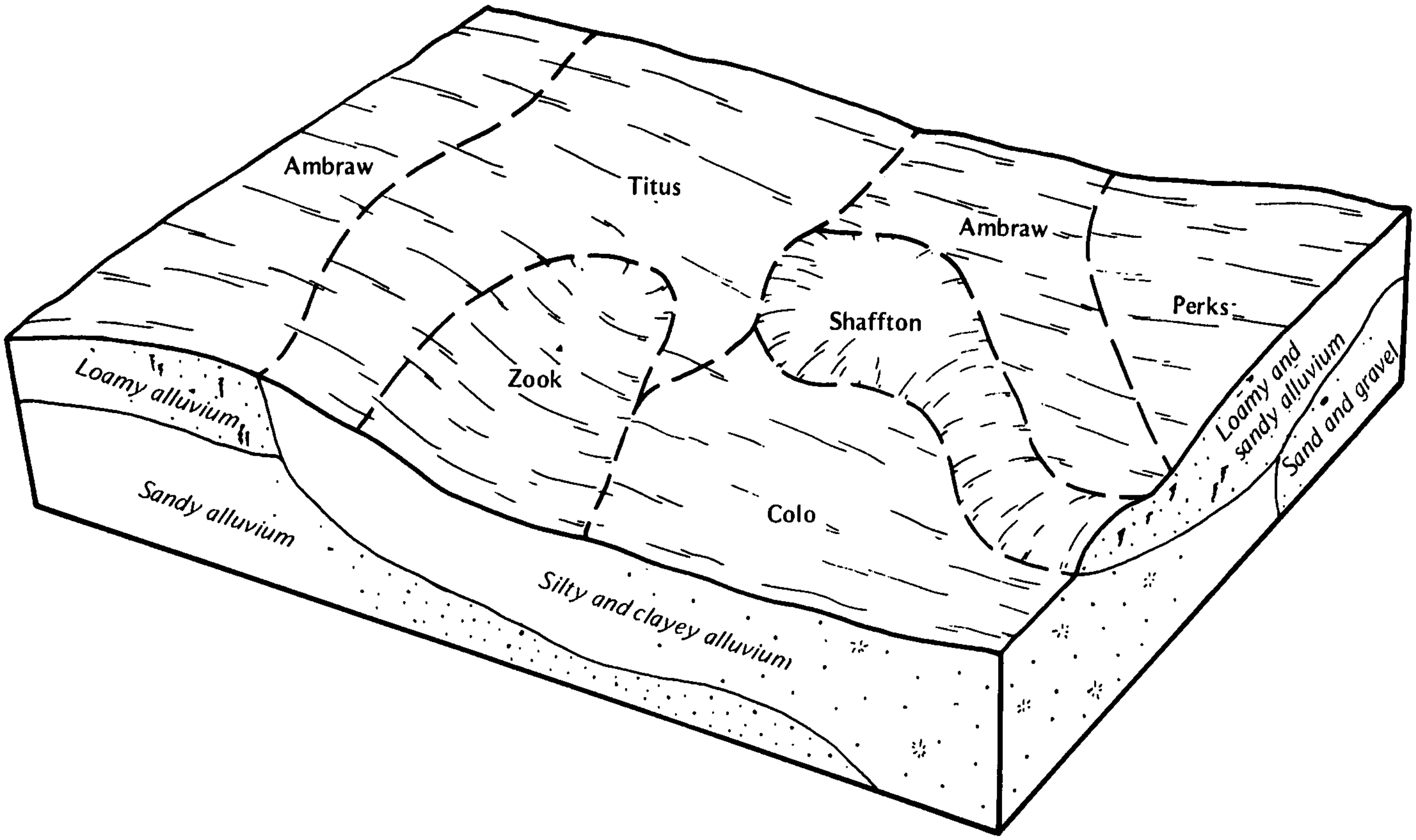

Figure 6.—Pattern of soils and parent material in the Titus-Ambraw-Colo association.

Most of the acreage is used for cultivated crops. Most of the trees in areas of this association are in groves or windbreaks near farmsteads. The main enterprise is the production of corn and soybeans for cash. The main management concerns are improving drainage and controlling floodwater. Levees protect the association against flooding. Many areas are drained by tile and drainage ditches leading to pumping stations, which move the water over the levees and into the river. Additional surface and subsurface drainage measures commonly are needed.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the substratum. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Clinton silt loam, 2 to 5 percent slopes, is a phase of the Clinton series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Nodaway-Klum complex, channeled, 0 to 5 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, limestone quarry, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

11B—Colo-Ely silty clay loams, 0 to 5 percent slopes. These gently sloping soils are on foot slopes, alluvial fans, and narrow flood plains, mainly along small streams in the uplands. The poorly drained Colo soil is near the stream channels. It is subject to flooding. The somewhat poorly drained Ely soil is at the base of upland slopes along the boundary of the mapped areas. Areas range from 5 to more than 50 acres in size and are long and narrow. They are about 70 percent Colo soil and 30 percent Ely soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Colo soil has a surface layer of black, friable silty clay loam about 8 inches thick. The subsurface layer is black and very dark gray, mottled, friable silty clay loam about 41 inches thick. The subsoil to a depth of about 60 inches is gray, friable silty clay loam. In places the surface layer is lighter colored and contains less organic matter.

Typically, the Ely soil has a surface layer of black, friable silty clay loam about 8 inches thick. The subsurface layer is very dark brown, mottled, friable silty clay loam about 19 inches thick. The subsoil to a depth of about 60 inches is mottled, friable silty clay loam. The upper part is dark grayish brown, and the lower part is grayish brown.

Permeability is moderate in both soils. Runoff is slow on the Colo soil and medium on the Ely soil. Available water capacity is high in both soils. Both have a seasonal high water table. The content of organic matter is 4 to 6 percent in the surface layer. The subsurface

layer generally is slightly acid. The substratum of the Colo soils has a medium supply of available phosphorus, and the Ely soil has a low supply. The Colo soil has a very low supply of available potassium, and the Ely soil has a low supply.

Most areas are used for cultivated crops. Many small areas are cropped along with areas of the adjacent soils. Some areas are used for permanent pasture. These soils are well suited to corn, soybeans, and small grain. A drainage system reduces the wetness and provides good aeration and a deep root zone for plants. Tile drains work well if they are properly installed and if an adequate outlet is available. A system of conservation tillage that leaves crop residue on the surface, contour farming, and terraces are needed in the higher areas to control runoff. Areas near small streams are subject to flooding of short duration. Diversions and channel improvements help to control floodwater and the runoff from the adjacent side slopes. Grassed waterways help to control erosion and prevent gullying.

These soils are well suited to grasses and legumes for hay and pasture. The forage species that grow best in the more nearly level, wetter areas are those that are tolerant of the wet conditions. Examples are birdsfoot trefoil, orchardgrass, red clover, and timothy. The better drained areas on side slopes are suitable for most forage species. Overwash and siltation can damage hayland and pasture unless conservation measures are applied in upslope areas. Restricted grazing and equipment use during wet periods can prevent excessive surface compaction, which results in poor tilth and excessive runoff. Pasture rotation is needed.

The land capability classification is IIw.

41—Sparta sand, 0 to 2 percent slopes. This nearly level, excessively drained soil is on stream terraces. Areas range from 5 to 30 acres in size and are irregularly shaped.

Typically, the surface layer is very dark brown, very friable sand about 10 inches thick. The subsurface layer is very dark grayish brown and dark brown, very friable sand about 14 inches thick. The subsoil is very friable sand about 20 inches thick. The upper part is dark brown, and the lower part is dark yellowish brown. The substratum to a depth of about 60 inches is brown fine sand. In places the soil has some fine gravel. In some areas the surface layer is loamy fine sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Watseka soils. These soils have a higher available water capacity than the Sparta soil. They are in low lying areas and in drainageways. They make up about 5 to 10 percent of the unit.

Permeability is rapid in the Sparta soil. Runoff is slow. Available water capacity is low. The content of organic matter in the surface layer is about 1 to 2 percent. Unless limed, the surface layer typically is medium acid. The subsoil is slightly acid or medium acid. The substratum generally has a very low supply of available phosphorus and potassium.

Most areas are cultivated or are used for hay and pasture. This soil is poorly suited to corn and soybeans. It is better suited to small grain and to grasses and legumes for hay and pasture. Windblown sand grains can damage seedlings on this soil and on the adjoining soils. Droughtiness is a limitation in most years unless rainfall is timely. If cultivated crops are grown, wind erosion is a hazard. Fall plowing increases the hazard. Cover crops and a system of conservation tillage that leaves crop residue on the surface conserve moisture and help to control erosion. Returning crop residue to the soil or regularly adding other organic material helps to maintain tilth and improves fertility.

A cover of pasture plants or hay is effective in controlling wind erosion. Managing pasture is difficult, however, because this soil is droughty. Permanent pasture can be improved by renovating and reseeding. The soil is suitable for drought-tolerant mixtures, such as alfalfa and smooth bromegrass or crownvetch and tall fescue. Restricted grazing and equipment use during dry periods can prevent excessive damage to the plant cover, which increases the susceptibility to wind erosion.

This soil is moderately suited to trees. It supports trees in groves and around farmsteads, but few areas are extensively wooded. Seedling mortality is a severe limitation. As a result, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate.

The land capability classification is IVs.

41B—Sparta sand, 2 to 5 percent slopes. This gently sloping, excessively drained soil is on stream terraces and on a few convex slopes in the uplands. Areas range from 5 to 40 acres in size and are irregularly shaped.

Typically, the surface layer is very dark brown, very friable sand about 10 inches thick. The subsurface layer is very dark grayish brown, very friable sand about 12 inches thick. The subsoil is very friable sand about 20 inches thick. The upper part is dark brown, and the lower part is dark yellowish brown. The substratum to a depth of about 60 inches is strong brown sand. In some places the surface layer is very dark brown and dark brown, friable loamy fine sand. In other areas the soil contains some fine gravel.

Permeability is rapid, and runoff is slow. Available water capacity is low. The content of organic matter in the surface layer is 1 to 2 percent. Unless limed, the surface layer typically is slightly acid or medium acid. The subsoil also is slightly acid or medium acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are cultivated or are used for pasture. This soil is poorly suited to corn and soybeans. It is better suited to small grain and to grasses and legumes for hay and pasture. Droughtiness is a limitation in most years unless rainfall is timely. If cultivated crops are grown, wind erosion and water erosion are hazards. Fall plowing increases these hazards. Windblown sand grains can damage seedlings on this soil and on the adjacent soils. Cover crops and a system of conservation tillage that leaves crop residue on the surface conserve moisture and help to prevent excessive soil loss. The soil is poorly suited to terracing. Returning crop residue to the soil or regularly adding other organic material helps to maintain tilth and improves fertility.

A cover of pasture plants or hay is effective in controlling erosion. This soil is suitable for drought-tolerant mixtures, such as alfalfa and smooth bromegrass or crownvetch and tall fescue. Restricted grazing and equipment use during dry periods can prevent excessive damage to the plant cover, which increases the susceptibility to wind erosion.

Only a few areas are used as woodland. This soil is moderately well suited to trees. Seedling mortality is a severe limitation. As a result, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate.

The land capability classification is IVs.

41C—Sparta sand, 5 to 9 percent slopes. This moderately sloping, excessively drained soil generally is on stream terraces and in isolated areas in the uplands. In a few areas it is on dunelike ridges oriented from northwest to southeast. Areas range from 5 to 30 acres in size and are irregularly shaped.

Typically, the surface layer is dark brown, very friable sand about 15 inches thick. The subsoil is very friable sand about 20 inches thick. It is brown in the upper part and dark yellowish brown and yellowish brown in the lower part. The substratum to a depth of about 60 inches is brown and strong brown sand. In some places the soil contains some fine gravel. In other places the surface layer is loamy sand. In some areas the slope is more than 9 percent.

Permeability is rapid, and runoff is medium. Available water capacity is low. The content of organic matter in the surface layer is about 0.5 to 1.0 percent. Reaction varies widely in the surface layer as a result of local liming practices. The subsoil is slightly acid or medium acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are cultivated, but some areas are pastured. This soil generally is poorly suited to cultivated crops. It is better suited to small grain and to grasses and legumes for hay or pasture. Droughtiness is a severe limitation in most years unless rainfall is timely. If cultivated crops are grown, erosion by wind and water is a severe hazard. Fall plowing increases the hazard. Windblown sand grains can damage seedlings on this soil and on the adjacent soils. A system of conservation tillage that leaves crop residue on the surface conserves moisture and helps to prevent excessive soil loss. The soil is poorly suited to terracing. Returning crop residue to the soil or regularly adding other organic material helps to maintain tilth and improves fertility.

A cover of pasture plants or hay is effective in controlling erosion. This soil is suitable for drought-tolerant mixtures, such as alfalfa and smooth bromegrass or crownvetch and tall fescue. Restricted grazing and equipment use during dry periods can prevent excessive damage to the plant cover, which increases the susceptibility to wind erosion.

This soil is moderately suited to trees. It supports trees in groves and around farmsteads, but few areas are extensively wooded. Seedling mortality is a severe limitation. As a result, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate.

The land capability classification is IVs.

63B—Chelsea loamy fine sand, 1 to 5 percent slopes. This gently sloping, excessively drained soil generally is on convex slopes in the uplands and on stream terraces. Areas range from 5 to more than 60 acres in size and are irregularly shaped or round.

Typically, the surface layer is very dark grayish brown, very friable loamy fine sand about 6 inches thick. The subsurface layer is about 14 inches thick. It is brown, very friable loamy sand and sand. Below this to a depth of about 60 inches is dark yellowish brown sand that has bands of brown and dark brown sandy loam 0.5 inch to 3.0 inches thick. In places the surface layer is fine sandy loam.

Included with this soil in mapping are small areas of the well drained Lamont soils. These soils are in positions on the landscape similar to those of the Chelsea soil. They have a higher available water capacity than the Chelsea soil. They make up less than 5 percent of the unit.

Permeability is rapid in the Chelsea soil, and runoff is slow. Available water capacity is low. The content of organic matter in the surface layer is about 0.5 to 1.0 percent. The subsurface layer is slightly acid to strongly acid. It generally has a very low supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops or pasture. A few small areas are used for timber. This soil is poorly suited to corn and soybeans. It is better suited to small grain and to grasses or legumes for hay or pasture. Droughtiness is a severe limitation in most years unless rainfall is timely. If cultivated crops are grown, wind

erosion is a hazard. It occurs initially on round, convex shoulder slopes. Windblown sand grains sometimes damage newly seeded crops on this soil and on the adjoining soils unless the surface is protected by a plant cover. Cover crops and a system of conservation tillage that leaves crop residue on the surface help to prevent excessive soil loss and conserve moisture. Fall plowing increases the hazards of water erosion and wind erosion. Returning crop residue to the soil or regularly adding other organic material improves fertility and increases the available water capacity.

A cover of pasture plants or hay is effective in controlling erosion. Managing pasture is difficult, however, because this soil is droughty. Permanent pasture can be improved by renovating and reseeding. The soil is suitable for drought-tolerant mixtures, such as alfalfa and smooth bromegrass or crownvetch and tall fescue. Restricted grazing and equipment use during dry periods can prevent excessive damage to the plant cover, which increases the susceptibility to wind erosion.

This soil is moderately suited to trees. It supports trees in groves and around farmsteads, but few areas are extensively wooded. Seedling mortality is a moderate limitation. As a result, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate.

The land capability classification is IVs.

63C—Chelsea loamy fine sand, 5 to 9 percent slopes. This moderately sloping, excessively drained soil is on moundlike ridges and convex side slopes in the uplands and on stream terraces. Areas range from 5 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is dark grayish brown, very friable loamy fine sand about 6 inches thick. The subsurface layer is brown, very friable fine sand about 15 inches thick. Below this to a depth of about 60 inches is yellowish brown sand that has bands of brown and dark brown sandy loam and loamy sand 0.25 inch to 2.0 inches thick. In places the surface layer is fine sandy loam.

Included with this soil in mapping are small areas of the well drained Lamont soils. These soils are in positions on the landscape similar to those of the Chelsea soil. They have a higher available water capacity than the Chelsea soil. They make up less than 5 percent of the unit.

Permeability is rapid in the Chelsea soil, and runoff is slow. Available water capacity is low. The content of organic matter in the surface layer is about 0.5 percent or less. The subsurface layer is slightly acid to strongly acid. It generally has a very low supply of available phosphorus and a low supply of available potassium.

Most areas are used for pasture. A few small areas are cultivated along with larger areas of adjacent soils that are well suited to crops. This soil is poorly suited to corn and soybeans. It is better suited to small grain and to grasses or legumes for hay or pasture. Droughtiness is a severe limitation in most years unless rainfall is timely. If cultivated crops are grown, erosion by wind and water is a hazard. Wind erosion occurs initially on round, convex shoulder slopes. Windblown sand grains sometimes damage newly seeded crops on this soil and on the adjoining soils unless the surface is protected by a plant cover. Cover crops and a system of conservation tillage that leaves crop residue on the surface help to prevent excessive soil loss and conserve moisture. The soil is poorly suited to terracing. Fall plowing increases the hazards of water erosion and wind erosion. Returning crop residue to the soil or regularly adding other organic material improves fertility and increases the available water capacity.

A cover of pasture plants or hay is effective in controlling erosion. The soil is suitable for drought-tolerant mixtures, such as alfalfa and smooth bromegrass or crownvetch and tall fescue. Restricted grazing and equipment use during dry periods can prevent excessive damage to the plant cover, which increases the susceptibility to wind erosion.

This soil is moderately suited to trees. It supports trees in groves and around farmsteads, but few areas are extensively wooded. Seedling mortality is a moderate limitation. As a result, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate.

The land capability classification is IVs.

63E—Chelsea loamy fine sand, 12 to 18 percent slopes. This strongly sloping and moderately steep, excessively drained soil is on convex slopes in the uplands and on escarpments on stream benches. Areas range from 5 to 30 acres in size and are irregularly shaped or elongated.

Typically, the surface layer is dark brown, very friable loamy fine sand about 3 inches thick. The subsurface layer is brown, very friable sand about 28 inches thick. Below this to a depth of about 60 inches is yellowish brown sand that has bands of brown loamy sand 0.25 inch to 2.0 inches thick. In places the surface layer is brown loamy fine sand.

Included with this soil in mapping are small areas of soils that are underlain by coarse sand and gravel. These soils are on escarpments. They make up less than 5 percent of the unit.

Permeability is rapid in the Chelsea soil. Runoff also is rapid. Available water capacity is low. The content of organic matter in the surface layer is less than 0.5 percent. The subsurface layer is slightly acid to strongly acid. It generally has a very low supply of available phosphorus and a low supply of available potassium.

Most areas support native hardwoods. A few are used for pasture. This soil is not suited to cultivated crops, mainly because it is droughty, low in fertility, and strongly sloping and moderately steep. Also, it is subject to wind erosion. As a result, a permanent plant cover is needed. Tilth generally is poor because the content of organic matter is low and because the soil structure breaks down easily.

A cover of pasture plants or hay is effective in controlling wind erosion. Production may be low. Renovating pastures may be difficult because of the slope. The soil is suitable for drought-tolerant mixtures, such as alfalfa and smooth bromegrass or crownvetch and tall fescue. Restricted grazing and equipment use during dry periods can prevent excessive damage to the plant cover, which increases the susceptibility to soil blowing.

This soil is moderately suited to trees. The pastured areas can be converted to woodland. The equipment limitation is severe, and the hazard of erosion is moderate. Seedlings should be planted at close intervals because the survival rate is limited. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate. Measures that control erosion are needed until the trees are large enough to provide a protective cover. Because of the slope, special logging equipment is needed. Also, caution is needed in operating this equipment.

The land capability classification is VIIs.

65D2—Lindley loam, 9 to 14 percent slopes, moderately eroded. This strongly sloping, well drained soil is on convex nose slopes and side slopes in the uplands. Areas range from 5 to 40 acres in size and are irregularly shaped.

Typically, the surface layer is dark grayish brown, friable loam about 9 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is about 38 inches thick. The upper part is yellowish brown, friable loam; the next part is yellowish brown, mottled, firm clay loam; and the lower part is yellowish brown and strong brown, mottled, firm clay loam. The substratum to a depth of about 60 inches is strong brown, yellowish brown, and grayish brown clay loam. In places the subsoil is reddish brown or yellowish red and contains more clay.

Permeability is moderately slow, and runoff is rapid. Available water capacity is high. The content of organic matter in the surface layer is less than 0.5 percent. The subsoil typically is strongly acid. It generally has a low supply of available phosphorus and a very low supply of available potassium.

Most areas are used for permanent pasture or cultivated crops. This soil is poorly suited to corn and soybeans. If cultivated crops are grown, erosion is a severe hazard. Grassed waterways and a system of conservation tillage that leaves crop residue on the surface help to prevent excessive soil loss. Growing the row crops in rotation with oats, hay, and pasture also is helpful. Tilth generally is fair in the surface layer. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to maintain or improve tilth, and increases the rate of water infiltration.

This soil is moderately suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

A few areas are wooded. This soil is moderately well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IVe.

65E—Lindley loam, 14 to 18 percent slopes. This moderately steep, well drained soil is on nose slopes and side slopes in the uplands. Areas range from 5 to 100 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable loam about 4 inches thick. The subsurface layer is dark grayish brown and brown, friable loam about 5 inches thick. The subsoil is about 41 inches thick. The upper part is yellowish brown, mottled, friable loam, and the lower part is yellowish brown and strong brown, mottled, firm clay loam. The substratum to a depth of about 60 inches is strong brown and grayish brown, mottled loam. In places the surface layer is brown clay loam. In some potentially seepy areas, the subsoil is reddish brown or yellowish red and contains more clay.

Included with this soil in mapping are small areas of Ashgrove soils, which occur as narrow bands on the upper side slopes. These soils are seepy during wet periods. They have a subsoil that contains more clay than that of the Lindley soil. They make up less than 5 percent of the unit.

Permeability is moderately slow in the Lindley soil, and runoff is rapid. Available water capacity is high. The content of organic matter in the surface layer is 1.0 to 1.5 percent. The subsoil typically is strongly acid. It generally has a low supply of available phosphorus and a very low supply of available potassium. Tilth generally is good or fair in the surface layer.

Most areas are used for pasture and hay or for timber. Because of the slope and a severe hazard of erosion, this soil generally is unsuitable for cultivated crops. It is moderately suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion.

Reseeding or pasture renovation is needed in some of the steeper areas, but preparing a seedbed is difficult. Because of the slope, caution is needed in operating farm machinery. Overgrazing or grazing when the soil is too wet causes surface compaction and deterioration of tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

A few areas support native hardwoods. This soil is moderately suited to trees. Erosion and the equipment limitation are the main management concerns. Carefully selecting sites for logging trails or roads and laying out the trails or roads on the contour help to control erosion. Because of the slope, special logging equipment is needed. Also, caution is needed in operating this equipment.

The land capability classification is Vle.

65E2—Lindley loam, 14 to 18 percent slopes, moderately eroded. This moderately steep, well drained soil is on nose slopes and side slopes in the uplands. Areas range from 5 to 100 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable loam about 7 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is about 37 inches thick. The upper part is yellowish brown, mottled, friable loam; the next part is yellowish brown, mottled, firm clay loam; and the lower part is strong brown, mottled, firm clay loam. The substratum to a depth of about 60 inches is strong brown and grayish brown clay loam. In places the surface layer is brown clay loam. In some potentially seepy areas, the subsoil is reddish brown or yellowish red and contains more clay.

Included with this soil in mapping are small areas of Ashgrove soils, which occur as narrow bands on the upper side slopes. These soils are seepy during wet periods. They have a subsoil that contains more clay than that of the Lindley soil. They make up less than 5 percent of the unit.

Permeability is moderately slow in the Lindley soil, and runoff is rapid. Available water capacity is high. The content of organic matter in the surface layer is less than 0.5 percent. The subsoil typically is strongly acid. It generally has a low supply of available phosphorus and a very low supply of available potassium. Tilth generally is good or fair in the surface layer.

Most areas are used for pasture and hay but have been cultivated at some time in the past. Because of the slope and a severe hazard of erosion, this soil generally is unsuitable for cultivated crops. It is moderately suited to grasses and legumes for hay and pasture (fig. 7). Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Reseeding or pasture renovation is needed in some of the steeper areas, but preparing a seedbed is difficult. Because of the slope, caution is needed in operating farm machinery. Overgrazing or grazing when the soil is too wet causes surface compaction and deterioration of tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

A few areas support native hardwoods. This soil is moderately suited to trees. Erosion, the equipment limitation, and seedling mortality are the main management concerns. Carefully selecting sites for logging trails or roads and laying out the trails or roads on the contour help to control erosion. Because of the slope, special logging equipment is needed. Also, caution is needed in operating this equipment. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate.

The land capability classification is Vle.

65F—Lindley loam, 18 to 25 percent slopes. This steep, well drained soil is on short, convex side slopes and nose slopes in the uplands. Areas range from 5 to 10 acres in size and are elongated.

Typically, the surface layer is very dark grayish brown, friable loam about 4 inches thick. The subsurface layer is brown, friable loam about 5 inches thick. The subsoil is yellowish brown, mottled, firm clay loam about 38 inches thick. The substratum to a depth of about 60 inches is yellowish brown and strong brown clay loam. In places the surface layer is brown and yellowish brown loam.

Included with this soil in mapping are small areas of reddish or grayish clay on the higher parts of the side slopes. Water seeps from these areas during extended wet periods. Included areas make up about 5 percent of the unit.

Permeability is moderately slow in the Lindley soil, and runoff is rapid. Available water capacity is high. The content of organic matter in the surface layer is 0.5 to 1.0 percent. The subsoil typically is strongly acid. It generally has a low supply of available phosphorus and a very low supply of available potassium. Tilth generally is fair in the surface layer.

Most areas are used for permanent pasture, woodland, or wildlife habitat. Because of a severe hazard of erosion and the slope, this soil generally is unsuited to cultivated crops. It is poorly suited to grasses and legumes for hay and pasture. A cover of pasture plants or hay is effective in controlling erosion. Production may be low. Overgrazing or grazing when the soil is too wet causes surface compaction and increases the runoff rate. Tall fescue, orchardgrass, or other forage species that can withstand livestock traffic should be selected for planting. Proper stocking rates, pasture rotation, timely

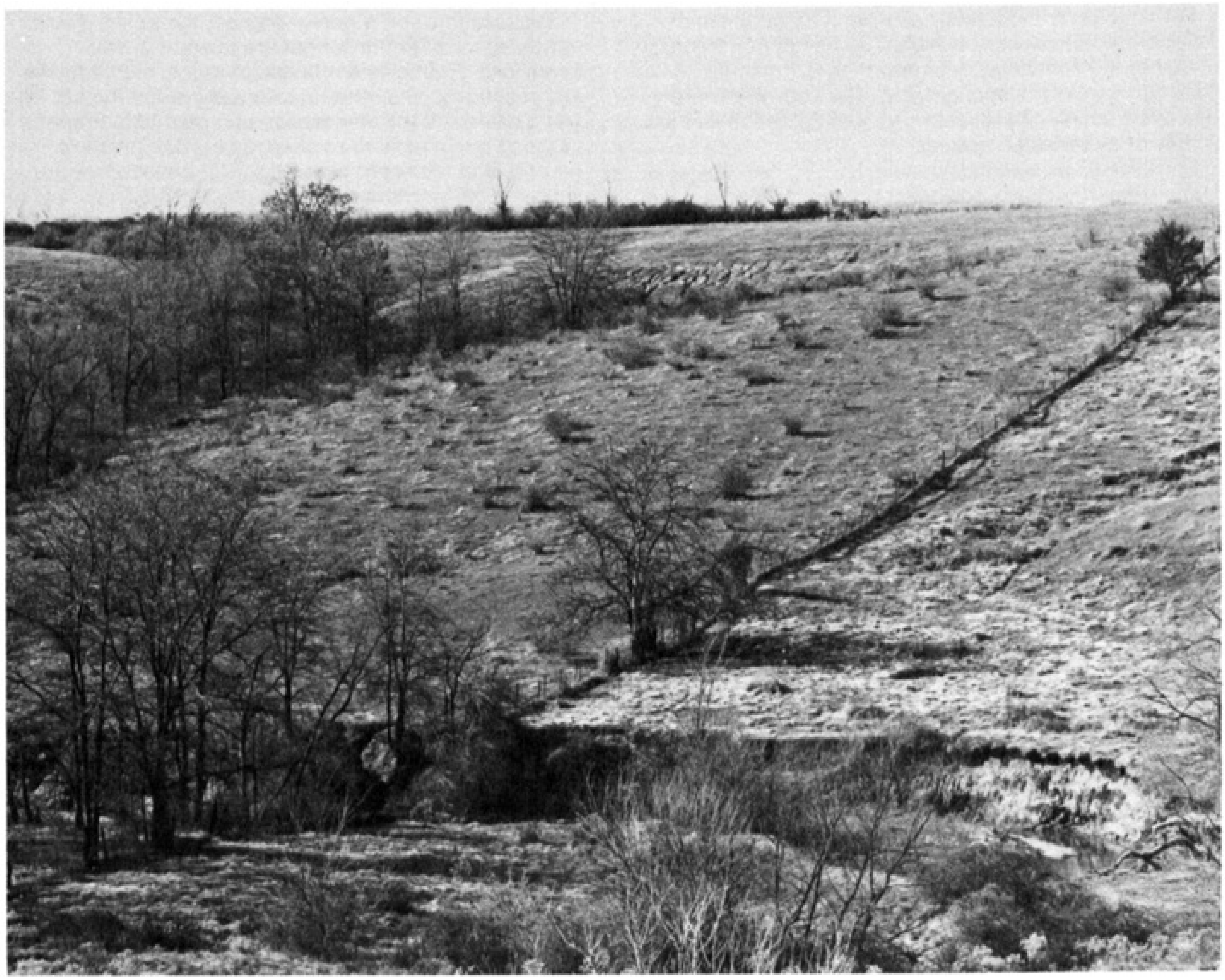

Figure 7.—A pastured area of Lindley loam, 14 to 18 percent slopes, moderately eroded.

deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition. In some areas the slope prohibits the use of ordinary farm machinery.

A few areas are wooded. This soil is moderately suited to trees. The equipment limitation and the hazard of erosion are moderate. Carefully selecting sites for logging trails or roads and laying out the trails or roads on the contour help to control erosion. Because of the slope, special logging equipment is needed. Also, caution is needed in operating this equipment.

The land capability classification is VIIe.

65G—Lindley loam, 25 to 40 percent slopes. This very steep, well drained soil is on dissected, convex side slopes along the major streams. Areas range from 20 to 100 acres in size and occur as long, narrow bands.

Typically, the surface layer is dark brown, friable loam about 5 inches thick. The subsurface layer also is dark brown, friable loam about 5 inches thick. The subsoil is yellowish brown, mottled, firm clay loam about 36 inches thick. The substratum to a depth of about 60 inches is yellowish brown and strong brown, mottled clay loam. In some places the slope is as much as 60 percent. In other places the lower part of the subsoil and the substratum contain more sand and are stratified.

Permeability is moderately slow, and runoff is rapid. Available water capacity is high. The content of organic matter in the surface layer is less than 0.5 percent. Reaction typically is strongly acid. The subsoil generally has a low supply of available phosphorus and a very low supply of available potassium.

Most areas are used as woodland or wildlife habitat. Many support native hardwoods. This soil is moderately suited to trees. It is unsuited to cultivated crops and poorly suited to hay and pasture because of the slope and a severe hazard of erosion. Erosion and the equipment limitation are the main management concerns in the wooded areas. Laying out logging trails or roads on the contour helps to control erosion. Because of the slope, operating some equipment is difficult or hazardous. Seedling mortality and plant competition generally are slight.

The land capability classification is VIIe.

74—Rubio silt loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is on the tops of ridges in the uplands. Areas range from 5 to 15 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 6 inches thick. The subsoil to a depth of about 60 inches is mottled silty clay loam. It is dark grayish brown and friable in the upper part, grayish brown and firm in the next part, and light brownish gray and friable in the lower part. In places the surface layer is lighter in color and contains less organic matter.

Included with this soil in mapping are areas of the somewhat poorly drained Givin soils on slight rises. Also included, in slight depressions, are areas that are subject to ponding. Included soils make up about 10 to 15 percent of the unit.

Permeability is slow in the Rubio soil. Runoff also is slow. Available water capacity is high. The soil has a seasonal high water table. Tilth generally is good. The content of organic matter is 2 to 3 percent in the surface layer. The subsoil has a high shrink-swell potential. It is strongly acid or medium acid. It generally has a medium supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, a subsurface drainage system is needed to reduce the wetness and provide aeration and a deep root zone for plants. Tile drains generally function satisfactorily if suitable outlets are available. In some areas a surface drainage system is needed. Returning crop residue to the soil and deferring fieldwork when the soil is wet help to prevent deterioration of tilth and improve fertility.

Because this soil is poorly drained, the only suitable forage species are those that are tolerant of wet conditions. Examples are birdsfoot trefoil, orchardgrass, and red clover. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

A few areas support native hardwoods. This soil is poorly suited to trees because of the wetness. The main management concerns are the equipment limitation, the windthrow hazard, and seedling mortality. Logging equipment should be used only during the drier periods or during the winter, when the ground is frozen. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate. A harvesting system that does not isolate the remaining trees or leave them widely spaced reduces the windthrow hazard.

The land capability classification is IIIw.

75—Givin silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on the tops of ridges in the uplands. Areas range from 5 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 3 inches thick. The subsoil is mottled, friable and firm silty clay loam about 42 inches thick. The upper part is brown and grayish brown, and the lower part is grayish brown and light olive brown. The substratum to a depth of about 60 inches is mottled olive gray and yellowish brown silty clay loam.

Included with this soil in mapping are small areas of the poorly drained Rubio soils. These soils make up about 5 to 10 percent of the unit.

Permeability is moderately slow in the Givin soil, and runoff is slow. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 2 to 3 percent. The subsoil typically is strongly acid or medium acid in the upper part. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Most areas are cultivated. Some are used for hay and pasture. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Most areas are adequately drained. In some areas, however, tile drains are needed to improve the timeliness of fieldwork in wet years. They function satisfactorily if suitable outlets are available. If cultivated, some areas are subject to erosion. Good tilth generally can be easily maintained. Returning crop residue to the soil and delaying fieldwork when the soil is wet help to prevent deterioration of tilth and improve fertility.

Nearly all forage species grow well on this soil. Overgrazing or grazing when the soil is wet, however, causes some surface compaction and deterioration of tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

A few small areas support native hardwoods. This soil is well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is I.

75B—Givin silt loam, 2 to 5 percent slopes. This gently sloping, somewhat poorly drained soil is on the tops of ridges in the uplands. Areas range from 5 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is very dark brown, friable silt loam about 8 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 4 inches thick. The subsoil is mottled, friable and firm silty clay loam about 36 inches thick. The upper part is dark grayish brown and brown, and the lower part is grayish brown and olive gray. The substratum to a depth of about 60 inches is mottled olive gray and yellowish brown silty clay loam.

Included with this soil in mapping are small areas of the moderately well drained Ladoga soils. These soils make up about 5 to 10 percent of the unit.

Permeability is moderately slow in the Givin soil, and runoff is slow. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 2 to 3 percent. The subsoil typically is strongly acid or medium acid in the upper part. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops. Some are used for hay and pasture. This soil is well suited to corn, soybeans, and small grain. If cultivated crops are grown, erosion is a hazard. It can be controlled, however, by a system of conservation tillage that leaves crop residue on the surface, by contour farming, and by terraces. In some areas farming on the contour and terracing are difficult because of short, irregular slopes. Most areas are adequately drained. In some areas, however, tile drains are needed to improve the timeliness of fieldwork in wet years. They function satisfactorily if suitable outlets are available. Good tilth generally can be easily maintained. Returning crop residue to the soil and delaying fieldwork when the soil is wet help to prevent deterioration of tilth and improve fertility.

This soil is well suited to grasses and legumes for hay and pasture. Nearly all forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is wet causes some surface compaction and deterioration of tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

A few small areas support native hardwoods. This soil is well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIe.

76B—Ladoga silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on the tops and sides of ridges in the uplands. Areas range from 5 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is brown, friable silt loam about 3 inches thick. The subsoil is silty clay loam about 39 inches thick. The upper part is brown and friable, the next part is brown and dark yellowish brown and is firm, and the lower part is brown and grayish brown, is mottled, and is friable. The substratum to a depth of about 60 inches is grayish brown, brown, and yellowish brown, mottled silty clay loam.

Included with this soil in mapping are areas of the nearly level, somewhat poorly drained Givin soils. These soils make up about 5 to 10 percent of the unit.

Permeability is moderately slow in the Ladoga soil, and runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 2 to 3 percent. The subsoil typically is medium acid or strongly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops or for hay and pasture. This soil is well suited to corn, soybeans, and small grain. If cultivated crops are grown, erosion is a hazard. It can be controlled by a system of conservation tillage that leaves crop residue on the surface, by contour farming, and by terraces. In places, however, farming on the contour and terracing are difficult because of short, irregular slopes. Good tilth generally can be easily maintained. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to prevent deterioration of tilth.

This soil is well suited to grasses and legumes for hay and pasture. Nearly all forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

A few areas support native hardwoods. This soil is well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIe.

76C—Ladoga silt loam, 5 to 9 percent slopes. This moderately sloping, moderately well drained soil is on the narrow tops and sides of ridges in the uplands. Areas range from 5 to 20 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is brown, friable silt loam about 3 inches thick. The subsoil is silty clay loam about 36 inches thick. The upper part is brown and friable; the next part is brown and dark yellowish brown, is mottled, and is firm; and the lower part is brown and grayish brown, is mottled, and is friable. The substratum to a depth of about 60 inches is grayish brown, brown, and yellowish brown, mottled silty clay loam. In some places the upper part of the subsoil is grayer. In other places the surface and subsurface layers have been mixed by plowing and are thinner.

Permeability is moderately slow, and runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 1.5 to 2.5 percent. The subsoil typically is medium acid or strongly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops or for hay and pasture. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, erosion is a hazard. It can be controlled by a system of conservation tillage that leaves crop residue on the surface, by contour farming, and by terraces. In places, however, farming on the contour and terracing are difficult because of short, irregular slopes. Good tilth generally can be easily maintained. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to prevent deterioration of tilth.

This soil is well suited to grasses and legumes for hay and pasture. Nearly all forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Pasture renovation is needed in many areas. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

A few areas support native hardwoods. This soil is well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIIe.

76C2—Ladoga silt loam, 5 to 9 percent slopes, moderately eroded. This moderately sloping, moderately well drained soil is on the narrow tops and sides of ridges in the uplands. Areas range from 5 to 40 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. Plowing has mixed some of the brown silty clay loam from the subsoil with the surface layer. The subsoil is silty clay loam about 34 inches thick. The upper part is brown and friable; the next part is brown and dark yellowish brown, mottled, and firm; and the lower part is brown and grayish brown and is friable. The substratum to a depth of about 60 inches is grayish brown, brown, and yellowish brown, mottled silty clay loam. In places the upper part of the subsoil is grayer.

Permeability is moderately slow, and runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 0.5 to 1.5 percent. The subsoil typically is medium acid or strongly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops. Some are used for hay and pasture. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a hazard. It can be controlled by a system of conservation tillage that leaves crop residue on the surface, by contour farming, and by terraces. In places, however, farming on the contour and terracing are difficult because of short, irregular slopes. Tilth generally is fair in the surface layer. This layer puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth. More intensive management and more nitrogen are needed to maintain productivity and improve tilth on this soil than on the uneroded Ladoga soils.

This soil is well suited to grasses and legumes for hay and pasture. Nearly all forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Pasture renovation is needed in some areas. Proper stocking rates, pasture rotation, and deferment of grazing during wet periods help to keep the pasture and the soil in good condition.

This soil is well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIIe.

76D2—Ladoga silt loam, 9 to 14 percent slopes, moderately eroded. This strongly sloping, moderately well drained soil is on convex side slopes in the uplands. Areas range from 5 to 40 acres in size and are long and narrow.

Typically, the surface layer is very dark grayish brown, friable loam about 7 inches thick. It is mixed with some streaks and pockets of brown subsoil material. The subsoil is silty clay loam about 32 inches thick. The upper part is brown and dark yellowish brown, is mottled, and is firm, and the lower part is brown and grayish brown, is mottled, and is friable. The substratum to a depth of about 60 inches is light brownish gray, mottled silty clay loam. In some places the upper part of the subsoil is grayer. In other places the surface layer is silty clay loam, is lighter colored, and has less organic matter.

Included with this soil in mapping are small areas of Rinda soils on the upper slopes. These soils contain more clay in the subsoil than the Ladoga soil. They are seasonally wet and seepy. They make up about 5 percent of the unit.

Permeability is moderately slow in the Ladoga soil, and runoff is rapid. Available water capacity is high. The content of organic matter in the surface layer is 0.5 to 1.0 percent. The subsoil typically is medium acid or strongly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops or for hay or pasture. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a hazard. Row crops can be grown in some years, however, if erosion is controlled. A system of conservation tillage that leaves crop residue on the surface helps to prevent excessive soil loss. Grassed waterways help to prevent gullying. In most areas contour farming and terracing are practical, but they are not so practical in areas where slopes are short and irregular. Tilth generally is fair in the surface layer. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to maintain tilth, and increases the rate of water infiltration.

This soil is well suited to grasses and legumes for hay and pasture. Nearly all forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Permanent pastures can be improved by renovating and reseeding. If permanent pastures are improved, the content of organic matter in this moderately eroded soil slowly increases. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

This soil is well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIIe.

80B—Clinton silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on the tops and sides of ridges in the uplands. Areas range from 5 to 60 acres in size and are irregularly shaped.

Typically, the surface layer is dark grayish brown, friable silt loam about 9 inches thick. The subsoil to a depth of about 60 inches is friable and firm silty clay loam. The upper part is dark yellowish brown and yellowish brown, the next part is yellowish brown and mottled, and the lower part is light olive brown and mottled. In some places, the soil is moderately eroded and the surface layer is lighter in color and contains less organic matter. In other places the subsoil is grayer.

Included with this soil in mapping are areas of the nearly level, somewhat poorly drained Keomah soils. These soils make up about 5 to 10 percent of the unit.

Permeability is moderately slow in the Clinton soil, and runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 1.5 to 2.5 percent. The subsoil typically is medium acid. It generally has a high supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops or for hay and pasture. Some are wooded. This soil is well suited to corn, soybeans, and small grain. If row crops are grown, erosion is a moderate hazard. It can be controlled by a system of conservation tillage that leaves crop residue on the surface, by contour farming, and by terraces. In places, however, farming on the contour and terracing are difficult because of short, irregular slopes. Good tilth generally can be easily maintained. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to prevent deterioration of tilth.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

A few areas support native hardwoods. This soil is well suited to trees. The hazard or limitations that affect planting or harvesting are slight.

The land capability classification is IIe.

80C—Clinton silt loam, 5 to 9 percent slopes. This moderately sloping, moderately well drained soil is on the tops and sides of ridges in the uplands. Areas range from 5 to 40 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 4 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 5 inches thick. The subsoil to a depth of about 60 inches is mottled, firm and friable silty clay loam. The upper part is dark yellowish brown, and the lower part is light brownish gray. In some places, the soil is moderately eroded and the surface layer is lighter in color and contains less organic matter. In other places the subsoil is grayish brown or light brownish gray and contains less clay.

Included with this soil in mapping are areas of Ashgrove soils at the head of drainageways. These soils have a subsoil that is grayer and contains more clay than that of the Clinton soil. They may be seepy. They make up about 5 to 10 percent of the unit.

Permeability is moderately slow in the Clinton soil, and runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 1 to 2 percent. The subsoil typically is medium acid. It

generally has a high supply of available phosphorus and a low supply of available potassium.

Most areas are used for pasture or woodland. Some areas are cultivated. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, erosion is a hazard. It can be controlled by a system of conservation tillage that leaves crop residue on the surface, by contour farming, and by terraces. In places, however, farming on the contour and terracing are difficult because of short, irregular slopes. Good tilth generally can be easily maintained. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to prevent deterioration of tilth.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

A few small areas support native hardwoods. This soil is well suited to trees. The hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIIe.

80C2—Clinton silt loam, 5 to 9 percent slopes, moderately eroded. This moderately sloping, moderately well drained soil is on the narrow tops and sides of ridges in the uplands. Areas range from 5 to 60 acres in size and are irregularly shaped.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is mottled, firm and friable silty clay loam about 44 inches thick. The upper part is dark yellowish brown and yellowish brown, and the lower part is light brownish gray. The substratum to a depth of about 60 inches is grayish brown and yellowish brown, mottled silty clay loam. In some places the subsoil is grayer and contains less clay. In other places the surface layer is silty clay loam and contains less organic matter.

Included with this soil in mapping are areas of Ashgrove soils at the head of drainageways. These soils have a subsoil that is grayer and contains more clay than that of the Clinton soil. They may be seepy. They make up about 10 percent of the unit.

Permeability is moderately slow in the Clinton soil, and runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 0.5 to 1.0 percent. The subsoil typically is slightly acid or medium acid. It generally has a high supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops or for hay and pasture. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a hazard. It can be controlled by a system of conservation tillage that leaves crop residue on the surface, by contour farming, and by terraces. In places, however, farming on the contour and terracing are difficult because of short, irregular slopes. The soil puddles if worked when wet and crusts after hard rains. Tilth generally is fair in the surface layer. More intensive management and more nitrogen are needed to maintain productivity and improve tilth on this soil than on the less eroded Clinton soils.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

Very few areas support native hardwoods. This soil is well suited to trees. The hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIIe.

80D—Clinton silt loam, 9 to 14 percent slopes. This strongly sloping, moderately well drained soil is on convex side slopes in the uplands. Areas range from 5 to 15 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 3 inches thick. The subsurface layer is brown, friable silt loam about 6 inches thick. The subsoil is firm and friable silty clay loam about 43 inches thick. The upper part is dark yellowish brown, the next part is yellowish brown and mottled, and the lower part is light brownish gray and mottled. The substratum to a depth of about 60 inches is yellowish brown and grayish brown, mottled silty clay loam. In places the subsoil is grayer.

Included with this soil in mapping are areas of the poorly drained Ashgrove soils on the lower slopes near the head of drainageways. These soils have a subsoil of grayish silty clay. They make up about 5 to 10 percent of the unit.

Permeability is moderately slow in the Clinton soil, and runoff is rapid. Available water capacity is high. The content of organic matter in the surface layer is about 0.5 to 1.0 percent. The subsoil typically is medium acid. It generally has a high supply of available phosphorus and a low supply of available potassium.

Most areas are used for pasture or woodland. Some areas are cultivated. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, erosion is a severe hazard. It can be controlled by a system of conservation tillage that leaves crop residue on the surface, by contour farming, and by terraces. In places, however, farming on the contour and terracing are difficult because of short, irregular slopes. Good tilth generally can be easily maintained. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding

other organic material improves fertility and helps to prevent deterioration of tilth.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Pasture renovation is needed in many areas. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

A few small areas support native hardwoods. This soil is well suited to trees. The hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIIe.

80D2—Clinton silt loam, 9 to 14 percent slopes, moderately eroded. This strongly sloping, moderately well drained soil is on the upper, convex side slopes in the uplands. Areas range from 5 to 20 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is mottled, firm and friable silty clay loam about 41 inches thick. The upper part is dark yellowish brown, and the lower part is yellowish brown and grayish brown. The substratum to a depth of about 60 inches is yellowish brown and grayish brown, mottled silty clay loam.

Included with this soil in mapping are small areas of the poorly drained Ashgrove soils on the lower slopes near the head of small drainageways. These soils have a subsoil of grayish silty clay. They make up about 5 to 10 percent of the unit.

Permeability is moderately slow in the Clinton soil, and runoff is rapid. Available water capacity is high. The content of organic matter in the surface layer is less than 0.5 percent. The subsoil typically is medium acid. It generally has a high supply of available phosphorus and a low supply of available potassium.

Many areas are used for cultivated crops. Some are used for hay and pasture. Nearly all were cultivated at some time in the past. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a severe hazard. It can be controlled by a system of conservation tillage that leaves crop residue on the surface, by terraces, and by contour farming. In places, however, farming on the contour and terracing are difficult because of short, irregular slopes. Tilth generally is fair in the surface layer. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

Very few areas support native hardwoods. This soil is well suited to trees. The hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIIe.

80D3—Clinton silty clay loam, 9 to 14 percent slopes, severely eroded. This strongly sloping, moderately well drained soil is on the upper, convex side slopes in the uplands. Areas range from 5 to 20 acres in size and are irregularly shaped.

Typically, the surface layer is brown and dark yellowish brown, friable silty clay loam about 9 inches thick. Plowing has mixed subsoil material with the surface layer. The subsoil is mottled, firm silty clay loam about 37 inches thick. The upper part is dark yellowish brown, and the lower part is grayish brown, yellowish brown, and brown. The substratum to a depth of about 60 inches is grayish brown and yellowish brown, mottled silty clay loam.

Included with this soil in mapping are small areas of the poorly drained Ashgrove soils on the lower slopes near the head of small drainageways. These soils have a subsoil of grayish silty clay. They make up about 5 to 10 percent of the unit.

Permeability is moderately slow in the Clinton soil, and runoff is rapid. Available water capacity is high. The content of organic matter in the surface layer is less than 0.5 percent. The subsoil typically is medium acid. It generally has a high supply of available phosphorus and a low supply of available potassium. Tilth generally is poor, and the soil is cloddy.

Most areas are used for cultivated crops. Some are used for hay and pasture. All were cultivated at some time in the past. This soil is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a severe hazard. A system of conservation tillage that leaves crop residue on the surface, terraces, and contour farming help to prevent excessive soil loss. In places, however, farming on the contour and terracing are difficult because of short, irregular slopes. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth. Much more intensive management and more nitrogen are needed to maintain productivity and improve tilth on this soil than on the less eroded Clinton soils.

This soil is moderately suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

Very few areas support native hardwoods. This soil is well suited to trees. The hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IVe.

110B—Lamont fine sandy loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex slopes on alluvial benches and uplands. Areas range from 5 to 20 acres in size and are irregularly shaped.

Typically, the surface layer is dark grayish brown, friable fine sandy loam about 9 inches thick. The subsurface layer is brown, friable fine sandy loam about 6 inches thick. The subsoil to a depth of about 60 inches is very friable fine sandy loam. The upper part is dark yellowish brown, and the lower part is brown.

Included with this soil in mapping are small areas of the excessively drained Chelsea soils. These soils are in positions on the landscape similar to those of the Lamont soil. They are slightly lower in organic matter content than the Lamont soil, have a lower available water capacity, and are more susceptible to wind erosion. They make up about 5 percent of the unit.

The Lamont soil is moderately rapidly permeable. Runoff is medium. Available water capacity is moderate. The content of organic matter in the surface layer is about 0.5 to 1.0 percent. The subsoil is medium acid or strongly acid. It has a low supply of available phosphorus and a very low supply of available potassium.

Some areas are used for cultivated crops. Many small areas are cropped along with large areas of adjacent soils that are well suited to crops. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, wind erosion is a hazard. It occurs initially on round, convex shoulder slopes. Windblown sand grains sometimes damage newly seeded crops on this soil and on the adjoining soils unless the surface is protected by a plant cover. A system of conservation tillage that leaves crop residue on the surface, cover crops, and grassed waterways help to prevent excessive soil loss. The soil is poorly suited to terracing because ridging the moderately coarse textured material is difficult and because the underlying coarse textured material is too close to the surface. If terraces are built, cuts should not expose the coarse textured material in terrace channels. Droughtiness is a limitation in most years unless rainfall is timely. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the available water capacity.

This soil is moderately suited to grasses and legumes for hay and pasture. Nearly all forage species are suitable. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is too wet or too dry reduces the extent of the protective plant cover and causes deterioration of the plant community. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet or dry periods help to keep the pasture and the soil in good condition.

Some areas support native hardwoods. This soil is moderately suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIIe.

118—Garwin silty clay loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is on concave slopes, at the head of drainageways, and on flats in the uplands. Areas are irregular in shape and range mainly from 10 to 100 acres in size.

Typically, the surface layer is black, friable silty clay loam about 8 inches thick. The subsurface layer is black and very dark gray, mottled, friable silty clay loam about 10 inches thick. The subsoil is olive gray, mottled, friable silty clay loam about 29 inches thick. The substratum to a depth of about 60 inches is olive gray silty clay loam. In places sand is within 8 feet of the surface.

Included with this soil in mapping are some areas of the somewhat poorly drained Muscatine soils on the higher, convex parts of the landscape. These soils make up about 5 percent of the unit.

The Garwin soil is moderately permeable. It has a seasonal high water table. Runoff is slow. The content of organic matter is 6 to 7 percent in the surface layer. The subsoil has a high shrink-swell potential. It is neutral in reaction. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain. It is suitable for intensive row cropping but is wet during the spring. It puddles if worked when wet. Artificial drains can lower the water table and thus improve the timeliness of fieldwork and provide aeration and a deep root zone for plants. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to maintain tilth.

If this soil is used for pasture, overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production. The suitable forage species are limited to those mixtures that are tolerant of wet conditions. Examples are birdsfoot trefoil and orchardgrass or red clover and timothy.

The land capability classification is IIw.

119—Muscatine silty clay loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on broad ridgetops in the uplands. Areas are irregularly shaped and range mainly from 10 to 100 acres in size.

Typically, the surface layer is black, friable silty clay loam about 7 inches thick. The subsurface layer is very dark gray and very dark grayish brown, friable silty clay loam about 8 inches thick. The subsoil is mottled, friable

silty clay loam about 36 inches thick. The upper part is dark grayish brown, and the lower part is grayish brown. The substratum to a depth of about 60 inches is grayish brown, mottled silty clay loam. In some places the surface layer is lighter in color, contains less organic matter, and is thinner. In other places sand is at a depth of 4 to 8 feet.

Included with this soil in mapping are small areas of the poorly drained Garwin soils. Also included are small areas where the slope is more than 2 percent. These areas are subject to erosion. Included soils make up 5 to 10 percent of the unit.

The Muscatine soil is moderately permeable. It has a seasonal high water table. Runoff is slow. Available water capacity is high. Tilth generally is good. The content of organic matter is 5 to 6 percent in the surface layer. The subsoil typically is medium acid or slightly acid in the upper part. It generally has a low supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain. In most areas it is adequately drained. In some areas, however, tile drains are needed to improve the timeliness of fieldwork in wet years. They function satisfactorily if suitable outlets are available. If cultivated, some areas are subject to erosion. Good tilth generally can be easily maintained. Returning crop residue to the soil or adding other organic material improves fertility and helps to maintain tilth.

This soil is well suited to grasses and legumes for hay and pasture. Only slight limitations affect the selection of suitable forage species. Overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production.

The land capability classification is I.

120B—Tama silty clay loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on broad, convex ridges in the uplands. Areas range from 10 to more than 60 acres in size and are irregularly shaped.

Typically, the surface layer is very dark brown, friable silty clay loam about 6 inches thick. The subsurface layer is very dark brown and very dark grayish brown, friable silty clay loam about 12 inches thick. The subsoil is friable silty clay loam about 40 inches thick. The upper part is brown, and the lower part is yellowish brown and mottled. The substratum to a depth of about 60 inches is yellowish brown, mottled silt loam. In places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet.

Included with this soil in mapping are small areas of the somewhat poorly drained, nearly level Muscatine soils. These soils make up 5 to 10 percent of the unit.

Permeability is moderate in the Tama soil, and runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 2 to 3 percent. The surface layer typically is neutral or slightly acid. The subsoil is medium acid or slightly acid. It generally has a medium supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain. If cultivated crops are grown, erosion is a hazard. It can be controlled, however, by contour farming, a system of conservation tillage that leaves crop residue on the surface, grassed waterways, terraces, and stripcropping. In most areas slopes are long enough and uniform enough for terracing. Good tilth generally can be easily maintained. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

This soil is well suited to grasses and legumes for hay and pasture. Nearly all forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

The land capability classification is IIe.

120C2—Tama silty clay loam, 5 to 9 percent slopes, moderately eroded. This moderately sloping, well drained soil is on convex side slopes in the uplands. Areas range from 20 to 40 acres in size and are elongated.

Typically, the surface layer is very dark brown, friable silty clay loam about 7 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is friable silty clay loam about 38 inches thick. The upper part is brown, and the lower part is yellowish brown and mottled. The substratum to a depth of about 60 inches is yellowish brown, mottled silt loam. In places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet.

Permeability is moderate, and runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 1 to 2 percent. The surface layer typically is neutral or slightly acid. The subsoil is slightly acid or medium acid. It generally has a medium supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is suited to corn, soybeans, and small grain. If cultivated crops are grown, erosion is a hazard. It can be controlled, however, by contour farming, a system of conservation tillage that leaves crop residue on the surface, grassed waterways, terraces, and stripcropping. Slopes are long enough and uniform enough for terracing. Grassed waterways help to prevent the formation of gullies. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the

soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

This soil is suited to grasses and legumes for hay and pasture. Nearly all forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

The land capability classification is IIIe.

122—Sperry silt loam, 0 to 1 percent slopes. This level, very poorly drained soil is in slight depressions on broad upland divides. It is subject to ponding. Areas range from 3 to more than 10 acres in size and are irregularly shaped.

Typically, the surface layer is black, friable silt loam about 10 inches thick. The subsurface layer is black and dark gray, mottled, friable silt loam about 9 inches thick. The subsoil is about 35 inches thick. The upper part is dark gray, mottled, firm silty clay; the next part is gray, mottled, firm silty clay; and the lower part is light olive gray and olive gray, mottled, firm and friable silty clay loam. The substratum to a depth of about 60 inches is light olive gray silty clay loam.

Permeability is slow, and runoff is slow to ponded. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 3 to 4 percent. The subsoil has a high shrink-swell potential. It typically is medium acid or slightly acid. It generally has a low supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, a subsurface drainage system is needed to reduce the wetness and provide aeration and a deep root zone for plants. Tile drains generally do not function satisfactorily because the soil is slowly permeable. In most areas a surface drainage system is needed. Returning crop residue to the soil and deferring fieldwork when the soil is wet improve fertility and help to prevent deterioration of tilth. The soil puddles if worked when wet and crusts after hard rains.

Because this soil is very poorly drained, the only suitable forage species are those mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy. Overgrazing or grazing when the soil is wet causes surface compaction and deterioration of tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

The land capability classification is IIIw.

127—Wiota silt loam, sandy substratum, 0 to 2 percent slopes. This nearly level, well drained soil is on stream terraces along the major streams and rivers. Areas range from 10 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 10 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam. It is about 12 inches thick. The subsoil is friable silty clay loam about 28 inches thick. The upper part is dark yellowish brown, and the lower part is yellowish brown. The substratum to a depth of about 60 inches is brown and pale brown sand. In some places, the depth to sand is 30 to 36 inches and the soil is more droughty. In other places the surface soil is lighter colored, is thinner, and contains less organic matter.

Included with this soil in mapping are small areas of the somewhat poorly drained Rowley soils. These soils make up about 10 percent of the unit.

The Wiota soil is moderately permeable in the subsurface layer and subsoil and rapidly permeable in the substratum. Runoff is slow. Available water capacity is high. The content of organic matter in the surface layer is about 3 to 4 percent. Unless limed, the surface layer typically is slightly acid or medium acid. The subsoil generally is slightly acid. It typically has a medium supply of available phosphorus and a low supply of available potassium. The surface layer is friable but tends to crust after hard rains. It puddles if tilled when wet.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Some areas adjacent to foot slopes receive runoff. Diversions help to control the runoff from the adjacent side slopes. Good tilth generally can be easily maintained.

A cover of pasture plants or hay increases the rate of water infiltration, helps to prevent excessive wind erosion, and improves tilth. Overgrazing or grazing when the soil is wet, however, causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition. Nearly all forage species grow well on this soil.

The land capability classification is I.

127B—Wiota silt loam, sandy substratum, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex slopes on stream terraces along the major streams or rivers. Areas range from 5 to 60 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 10 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam. It is about 12 inches thick. The subsoil is friable silty clay

loam about 24 inches thick. The upper part is dark yellowish brown, and the lower part is yellowish brown. The substratum to a depth of about 60 inches is brown and pale brown sand. In some areas the surface soil is thinner, lighter colored, and lower in content of organic matter. In other areas slopes are short and are as steep as 9 percent. In places the depth to sand is 30 to 36 inches.

Permeability is moderate in the upper part of the profile and rapid in the substratum. Runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 3 to 4 percent. Unless limed, the surface layer typically is slightly acid or medium acid. The subsoil typically is slightly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium. The surface layer is friable but tends to crust after hard rains. It puddles if tilled when wet.

Most areas are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If the soil is used for cultivated crops, erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface helps to prevent excessive soil loss. Some areas are suitable for farming on the contour and terracing because they have uniform slopes. Returning crop residue to the soil or adding other organic material improves fertility, minimizes crusting, increases the rate of water infiltration, and helps to maintain good tilth. Some areas adjacent to foot slopes receive runoff. Diversions help to control the runoff from the adjacent side slopes. Good tilth generally can be easily maintained.

A cover of pasture plants or hay helps to control erosion and improves tilth. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition. Almost all forage species grow well on this soil.

The land capability classification is IIe.

133—Colo silty clay loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is at the lower elevations on bottom land. It is subject to flooding. Areas are irregularly shaped. They generally range from 5 to 100 acres in size, but some are as large as 300 acres.

Typically, the surface layer is black, friable silty clay loam about 8 inches thick. The subsurface layer is black and very dark gray, mottled, friable silty clay loam about 41 inches thick. The subsoil to a depth of about 60 inches is gray, friable silty clay loam. In places about 12 inches of recently deposited silt loam overlies the surface layer.

Included with this soil in mapping are small areas of the somewhat poorly drained Ackmore soils. These soils are near stream channels. They can be tilled more easily than the Colo soil and dry out more rapidly after rains. They make up less than 10 percent of the unit.

Permeability is moderate in the Colo soil, and runoff is slow. Available water capacity is high. The soil has a seasonal high water table. It typically is slightly acid throughout. The content of organic matter in the surface layer is about 4 to 6 percent. The subsoil generally has a medium supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain. A drainage system reduces the wetness and provides good aeration and a deep root zone for plants. Tile drains work well if they are properly installed and if an adequate outlet is available. In many areas diversion terraces can help to control the runoff from nearby soils. Tilth generally is fair in the surface layer. Returning crop residue to the soil or regularly adding other organic material and deferring tillage when the soil is wet improve tilth and fertility, help to prevent excessive surface crusting, and increase the rate of water infiltration.

If this soil is used for pasture, overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production. The suitable forage species are limited to those mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy.

The land capability classification is IIw.

134—Zook silty clay, 0 to 2 percent slopes. This nearly level, poorly drained soil is in the lower areas on bottom land. It is subject to flooding. Areas range from 20 to 250 acres in size and are wide and irregularly shaped.

Typically, the surface layer is black, firm silty clay about 8 inches thick. The subsurface layer also is black, firm silty clay. It is about 43 inches thick. It is mottled in the lower part. The subsoil to a depth of about 60 inches is dark gray, mottled, firm silty clay loam. In some places the surface layer is silty clay loam. In other places the subsoil contains less clay.

Permeability and runoff are slow. Available water capacity is high. This soil has a seasonal high water table. The content of organic matter in the surface layer is about 4 to 6 percent. Reaction typically is slightly acid or neutral in the surface layer, the subsurface layer, and the upper part of the subsoil. The subsoil generally has a medium supply of available phosphorus and has a low supply of available potassium. Tilth generally is poor.

Most areas are used for cultivated crops. If drained, this soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. A drainage system is needed to reduce the wetness and provide good aeration and a deep root zone for plants. Tile drains generally work satisfactorily only if they are closely spaced and if an adequate outlet

is available. Surface drains are needed to remove surface water from some areas. Returning crop residue to the soil and deferring tillage when the soil is wet help to maintain tilth. Flooding is a hazard, but many areas are at least partly protected by levees and dikes. Flooding can still occur in these areas if the levees and dikes are breached.

The only suitable hay and pasture species are those mixtures that are tolerant of wet conditions. Examples are birdsfoot trefoil and orchardgrass or red clover and timothy. Restricted grazing and equipment use during wet periods can prevent excessive surface compaction and deterioration of tilth.

The land capability classification is IIIw.

135—Coland clay loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is on bottom land. It is subject to flooding. Areas range from 10 to 50 acres in size and are long and narrow.

Typically, the surface layer is black, friable clay loam about 9 inches thick. The subsurface layer also is black, friable clay loam. It is about 30 inches thick. The next layer is black and dark olive gray, mottled, friable clay loam about 9 inches thick. The substratum to a depth of 60 inches is dark gray, mottled, stratified sandy loam and sandy clay loam. In some areas the surface soil is only about 18 inches thick. In some places the surface layer is silty clay loam. In other places it contains more sand and less clay.

Included with this soil in mapping are small areas of the droughty Perks soils. These soils are generally at the slightly higher elevations. They make up about 5 percent of the unit.

Permeability is moderate in the Coland soil, and runoff is slow. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 3 to 4 percent. The subsoil typically is slightly acid. The substratum generally has a medium supply of available phosphorus and a very low supply of available potassium. Tilth generally is poor.

Most areas are used for cultivated crops. Some areas that are not protected from flooding or that are isolated by a meandering stream are used for pasture. If adequately drained and protected against flooding, this soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Special care generally is needed to improve tilth in the surface layer. Chisel plowing increases the infiltration rate by making the surface more pervious to water. Cultivating when the soil is too wet causes surface compaction and cloddiness. Returning crop residue to the soil or regularly adding other organic material helps to control wind erosion and prevent excessive surface crusting and increases the rate of water infiltration.

The only suitable forage species are those mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy. Grazing and equipment use should be restricted during wet periods.

The land capability classification is IIw.

139—Perks loamy sand, 0 to 3 percent slopes. This very gently sloping, excessively drained soil is on broad flood plains. It is subject to flooding. Areas are irregular in shape and range mainly from 10 to 120 acres in size.

Typically, the surface layer is very dark grayish brown, very friable loamy sand about 9 inches thick. The substratum to a depth of about 60 inches is yellowish brown and light yellowish brown sand. In places the surface layer is sand.

Included with this soil in mapping are some areas of the somewhat poorly drained Shaffton soils in low depressional spots. These soils are stratified in the substratum. They make up about 5 to 10 percent of the unit.

The Perks soil is rapidly permeable in the substratum. Runoff is slow. Available water capacity is very low or low. The content of organic matter is 0.5 to 1.5 percent in the surface layer. The substratum is slightly acid or medium acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. Some are used as woodland. This soil is poorly suited to corn, soybeans, and small grain and to legumes for hay and pasture. It is very droughty unless rainfall is above normal and timely. Flooding can cause some crop damage, but it is usually brief or very brief. If cultivated crops are grown, wind erosion is a severe hazard. A system of conservation tillage that leaves crop residue on the surface helps to control wind erosion and conserves moisture. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to maintain or improve tilth.

A cover of hay or pasture plants is effective in controlling wind erosion. The suitable forage species are limited to those that are tolerant of dry conditions. Examples are alfalfa, smooth bromegrass, and crownvetch. Managing pasture and hayland is difficult because the soil is subject to flooding and is droughty during dry periods. Forage production may be limited during hot, dry periods because of the very low available water capacity in the substratum. Pasture rotation is needed.

This soil is well suited to trees. The main management concern is seedling mortality. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate.

The land capability classification is IVs.

140—Sparta loamy sand, 0 to 2 percent slopes. This nearly level, excessively drained soil is on stream

terraces. Individual areas are irregular in shape and range mainly from 10 to 100 acres in size.

Typically, the surface layer is very dark brown and black, very friable loamy fine sand about 6 inches thick. The subsurface layer is very dark brown and dark brown, very friable loamy sand about 38 inches thick. The subsoil is brown, very friable sand about 7 inches thick. The substratum to a depth of about 60 inches is brown sand. In places the dark colors do not extend to so great a depth.

Included with this soil in mapping are small areas of the somewhat poorly drained Watseka soils. These soils are in low lying areas and in drainageways. They make up about 5 to 10 percent of the unit.

Permeability is rapid in the Sparta soil. Runoff is slow. Available water capacity is low. The content of organic matter in the surface layer is 1 to 2 percent. The subsoil is medium acid. It has a very low supply of available phosphorus and potassium.

Most areas are cultivated. This soil is poorly suited to corn and soybeans. It is better suited to small grain and to grasses and legumes for hay and pasture. Windblown sand can damage newly seeded crops on this soil and on the adjoining soils. Droughtiness is a limitation in most years unless rainfall is timely. If cultivated crops are grown, wind erosion is a hazard. Fall plowing increases the hazard. Cover crops and a system of conservation tillage that leaves crop residue on the surface conserve moisture and help to control erosion. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to maintain tilth.

A cover of pasture plants or hay is effective in controlling wind erosion. The suitable forage species are limited to those mixtures that are tolerant of dry conditions, such as alfalfa and smooth bromegrass or crownvetch and tall fescue. Forage production is limited during hot, dry periods because of the droughtiness. Restricted grazing and equipment use during dry periods can prevent excessive damage to the plant cover, which increases the susceptibility to wind erosion.

This soil is moderately suited to trees. Seedlings do not survive well. As a result, they should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate.

The land capability classification is IVs.

141—Watseka loamy fine sand, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on alluvial terraces and on uplands. Areas range from 10 to 100 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, very friable loamy fine sand about 8 inches thick. The subsurface layer also is very dark grayish brown, very friable loamy fine sand. It is about 10 inches thick. The subsoil is very friable loamy fine sand about 28 inches thick. The upper part is dark grayish brown, the next part is dark grayish brown and grayish brown, and the lower part is light olive brown and mottled. The substratum to a depth of about 60 inches is light olive brown and light yellowish brown sand. In places the soil is better drained.

Permeability is rapid, and runoff is very slow. Available water capacity is low. This soil has a seasonal high water table. The content of organic matter in the surface layer is about 1.0 to 1.5 percent. The subsoil is medium acid or slightly acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. Many small areas are cropped along with larger areas of adjacent soils that are well suited to crops. This soil is moderately suited to corn, soybeans, and small grain. Droughtiness is a limitation during periods of below normal rainfall. The water table is moderately high in the spring but drops rapidly during the growing season. Installing tile is difficult in some areas because of the loose, water-bearing sand. If cultivated crops are grown, wind erosion is a hazard. Windblown sand grains sometimes damage newly seeded crops on this soil and on the adjoining soils unless the surface is protected by a plant cover. Cover crops and a system of conservation tillage that leaves crop residue on the surface help to prevent excessive soil loss. Returning crop residue to the soil or regularly adding other organic material improves fertility and increases the rate of water infiltration.

This soil is moderately suited to grasses and legumes for hay and pasture. Most forage species are suitable. A cover of pasture plants or hay is effective in controlling wind erosion. Overgrazing or grazing when the soil is too wet or too dry, however, reduces the extent of the protective plant cover and causes deterioration of the plant community. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet or dry periods help to keep the pasture and the soil in good condition.

The land capability classification is IIIs.

152—Marshan clay loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is on stream terraces. Areas range from 10 to more than 80 acres in size and are irregularly shaped.

Typically, the surface layer is black, friable clay loam about 8 inches thick. The subsurface layer is black and very dark gray, friable clay loam about 15 inches thick. The subsoil is about 21 inches thick. It is olive gray and mottled. The upper part is friable clay loam, and the lower part is very friable fine sandy loam. The substratum to a depth of about 60 inches is light olive gray loamy sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Watseka soils. These soils are in the slightly higher lying areas. They make up about 5 to 10 percent of the unit.

The Marshan soil is moderately permeable. Runoff is slow. Available water capacity is moderate or high. The soil has a seasonal high water table. It typically is slightly acid throughout. The content of organic matter in the surface layer is about 4 to 5 percent. The subsoil has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. This soil is well suited to intensively cropped corn, soybeans, and small grain. If row crops are grown, a drainage system is needed to lower the water table and improve the timeliness of fieldwork. Measures that help to control the runoff from higher elevations also are needed. Establishing adequate drainage outlets and installing drainage tile are difficult in some areas because of the loose, water-bearing sand. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

Inadequately drained areas generally are used for pasture. The suitable forage species are limited to those mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

The land capability classification is IIw.

160—Walford silt loam, 0 to 1 percent slopes. This level, poorly drained soil is in plane or depressional areas on uplands. Areas are irregular in shape and range mainly from 5 to 40 acres in size.

Typically, the surface layer is very dark gray, friable silt loam about 9 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 10 inches thick. The subsoil is mottled silty clay loam about 33 inches thick. The upper part is grayish brown and is firm and friable. The lower part is light brownish gray and firm. The substratum to a depth of about 60 inches is light brownish gray, mottled silty clay loam. In places sand is within a depth of 8 feet.

Permeability is moderately slow, and runoff is slow. Available water capacity is high. This soil has a seasonal high water table. The organic matter content is 2.5 to 3.5 percent in the surface layer. The subsoil is medium acid or strongly acid. It generally has a medium supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The high water table is the main limitation. Some areas are ponded for short periods. Tile drains generally work well if suitable outlets are available, but surface drains are needed in some areas. The soil tends to puddle if worked when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

Because this soil is poorly drained, the only suitable forage species are those mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy. Restricted grazing and equipment use during wet periods can prevent excessive surface compaction.

A few small areas support native hardwoods. This soil is poorly suited to trees because of the wetness. The main management concerns are the equipment limitation, the windthrow hazard, and seedling mortality. Logging equipment should be used only during the drier periods or during the winter, when the ground is frozen. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate. A harvesting system that does not isolate the remaining trees or leave them widely spaced reduces the windthrow hazard.

The land capability classification is IIIw.

162B—Downs silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on narrow ridges in the uplands. Areas range from 10 to 80 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsoil to a depth of about 60 inches is friable silty clay loam. The upper part is dark yellowish brown and yellowish brown, and the lower part is yellowish brown and mottled. In places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet.

Included with this soil in mapping are some small areas of the somewhat poorly drained, nearly level Atterberry soils. These soils have a subsoil that is more gray than that of the Downs soil. They make up less than 10 percent of the unit.

Permeability is moderate in the Downs soil, and runoff is medium in cultivated areas. Available water capacity is high. The content of organic matter in the surface layer is about 2 to 3 percent. The subsoil typically is medium acid. It generally has a high supply of available phosphorus and a very low supply of available potassium. The surface layer tends to crust after hard rains and puddles if tilled when wet.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface, grassed waterways, and stripcropping help to prevent excessive soil loss. Slopes generally are long enough and uniform enough for terracing and contour farming. Good tilth generally can be easily maintained. If the soil is cultivated, returning crop residue to the soil or

regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

A cover of pasture plants or hay is effective in controlling erosion. Most forage species are suitable. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting if the proper species are selected for planting and the woodland is managed properly.

The land capability classification is IIe.

162C—Downs silt loam, 5 to 9 percent slopes. This moderately sloping, well drained soil is on narrow ridges and convex side slopes in the uplands. Areas range from 5 to 25 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 4 inches thick. The subsoil is about 45 inches thick. It is friable. The upper part is brown and dark yellowish brown silt loam, and the lower part is yellowish brown, mottled silty clay loam. The substratum to a depth of about 60 inches is yellowish brown, mottled silt loam. In some places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet. In other places the surface layer is thinner, is lighter in color, and has less organic matter.

Permeability is moderate, and runoff is medium in cultivated areas. Available water capacity is high. The content of organic matter in the surface layer is about 2 to 3 percent. The subsoil typically is medium acid. It generally has a medium supply of available phosphorus and a very low supply of available potassium.

Most areas are used as woodland or pasture, but some are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface and grassed waterways help to prevent excessive soil loss. If cultivated, the surface layer tends to crust after hard rains. It puddles if tilled when wet. Slopes commonly are long enough and uniform enough for terraces and contour farming. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

A cover of pasture plants or hay is effective in controlling erosion. Most forage species are suitable. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate and the likelihood of puddling. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

A few areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting if the proper species are selected for planting and the woodland is managed properly.

The land capability classification is IIIe.

162C2—Downs silt loam, 5 to 9 percent slopes, moderately eroded. This moderately sloping, well drained soil is on narrow ridges and convex side slopes in the uplands. Areas range from 5 to more than 50 acres in size and are irregularly shaped.

Typically, the surface layer is dark brown, friable silt loam about 8 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is friable silty clay loam about 47 inches thick. The upper part is dark brown, and the lower part is yellowish brown and mottled. The substratum to a depth of about 60 inches is yellowish brown, mottled silt loam. In some places the surface layer is brown silty clay loam. In other places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet.

Permeability is moderate, and runoff is medium in cultivated areas. Available water capacity is high. The content of organic matter in the surface layer is about 1 to 2 percent. The subsoil typically is medium acid. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface, grassed waterways, and stripcropping help to prevent excessive soil loss. Slopes commonly are long enough and uniform enough for terraces and contour farming. Tilth generally is fair in the surface layer. If cultivated, the surface layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species are suitable. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting if the proper species are selected for planting and the woodland is managed properly.

The land capability classification is IIIe.

162D2—Downs silt loam, 9 to 14 percent slopes, moderately eroded. This strongly sloping, well drained soil is on convex side slopes in the uplands. Areas range from 5 to 20 acres in size and are elongated.

Typically, the surface layer is dark brown, friable silt loam about 8 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is friable silty clay loam about 42 inches thick. The upper part is dark brown, and the lower part is yellowish brown. The substratum to a depth of about 60 inches is yellowish brown, mottled silt loam. In some places the surface layer is brown silty clay loam. In other places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet.

Permeability is moderate, and runoff is rapid. Available water capacity is high. The content of organic matter in the surface layer is about 1 to 2 percent. The subsoil typically is medium acid. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is suited to corn and soybeans occasionally grown in rotation with small grain. If cultivated crops are grown, further erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface, grassed waterways, and stripcropping help to prevent excessive soil loss. Slopes commonly are long enough and uniform enough for terracing and farming on the contour. Tilth generally is fair in the surface layer. If cultivated, this layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent surface crusting, and increases the rate of water infiltration.

This soil is suited to grasses and legumes for hay and pasture. Most forage species are suitable. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting if the proper species are selected for planting and the woodland is managed properly.

The land capability classification is IIIe.

163B—Fayette silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops. Areas range from 5 to 80 acres in size and are irregularly shaped.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is brown, friable silt loam about 3 inches thick. The subsoil to a depth of about 60 inches is yellowish brown, friable silty clay loam. It is mottled in the lower part. In places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet.

Included with this soil in mapping are the poorly drained Stronghurst soils. These soils make up 5 to 10 percent of the unit.

Permeability is moderate in the Fayette soil, and runoff is medium in cultivated areas. Available water capacity is high. The content of organic matter in the surface layer is about 1 to 2 percent. The subsoil typically is medium acid or strongly acid. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface, grassed waterways, and stripcropping help to prevent excessive soil loss. Slopes commonly are long enough and uniform enough for terraces and contour farming. Tilth generally is fair in the surface layer. If cultivated, the surface layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

A cover of pasture plants or hay is effective in controlling erosion. Nearly all forage species are suitable. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

A few small areas support native hardwoods. This soil is well suited to trees. Seedlings survive and grow well. No major hazards or limitations affect planting or harvesting.

The land capability classification is IIe.

163C—Fayette silt loam, 5 to 9 percent slopes. This moderately sloping, well drained soil is on narrow ridges and convex side slopes. Areas range from 5 to 20 acres in size and are irregularly shaped.

Typically, the surface layer is dark grayish brown, friable silt loam about 5 inches thick. The subsurface layer also is dark grayish brown, friable silt loam. It is about 6 inches thick. The subsoil to a depth of about 60 inches is dark yellowish brown and yellowish brown, friable silty clay loam. It is mottled in the lower part. In some places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet. In other places the surface layer

and subsurface layer are mixed and are lighter colored because of erosion.

Permeability is moderate, and runoff is medium in cultivated areas. Available water capacity is high. The content of organic matter in the surface layer is about 1.0 to 1.5 percent. The subsoil typically is medium acid or strongly acid. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Most areas are used for woodland or permanent pasture, but some are used for cultivated crops. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface, grassed waterways, and stripcropping help to prevent excessive soil loss. Slopes commonly are long enough and uniform enough for terraces and contour farming. Tilth generally is fair in the surface layer. If cultivated, the surface layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

A cover of pasture plants or hay is effective in controlling erosion. Nearly all forage species are suitable. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

Many areas support native hardwoods. This soil is well suited to trees. Seedlings survive and grow well. No major hazards or limitations affect planting or harvesting.

The land capability classification is IIIe.

163C2—Fayette silt loam, 5 to 9 percent slopes, moderately eroded. This moderately sloping, well drained soil is on narrow ridges and convex side slopes. Areas range from 5 to more than 40 acres in size and are irregularly shaped.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil to a depth of about 60 inches is friable silty clay loam. The upper part is dark yellowish brown and yellowish brown, and the lower part is yellowish brown and mottled. In some places the surface layer is brown silty clay loam. In other places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet.

Permeability is moderate, and runoff is medium or rapid in cultivated areas. Available water capacity is high. The content of organic matter in the surface layer is less than 0.5 percent. The subsoil typically is medium acid or strongly acid. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, further erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface, grassed waterways, and stripcropping help to prevent excessive soil loss. Slopes commonly are long enough and uniform enough for terraces and contour farming. Tilth generally is fair in the surface layer. If cultivated, the surface layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

A cover of pasture plants or hay is effective in controlling erosion. Nearly all forage species are suitable. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

This soil is well suited to trees. Seedlings survive and grow well. No major hazards or limitations affect planting or harvesting.

The land capability classification is IIIe.

163D—Fayette silt loam, 9 to 14 percent slopes. This strongly sloping, well drained soil is on convex side slopes. Areas range from 5 to 25 acres in size and are elongated.

Typically, the surface layer is very dark grayish brown, friable silt loam about 3 inches thick. The subsurface layer is brown, friable silt loam about 7 inches thick. The subsoil is friable silty clay loam about 46 inches thick. The upper part is dark yellowish brown and yellowish brown, and the lower part is yellowish brown and mottled. The substratum to a depth of about 60 inches is yellowish brown, mottled silt loam. In some places the surface layer is dark grayish brown silt loam about 7 inches thick. In other places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet.

Included with this soil in mapping are small areas of Lindley soils on the lower parts of the side slopes. These soils contain more sand than the Fayette soil. They make up less than 5 percent of the unit.

Permeability is moderate in the Fayette soil, and runoff is rapid in cultivated areas. Available water capacity is high. The content of organic matter in the surface layer is about 0.5 to 1.0 percent. The subsoil typically is medium acid or strongly acid. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Most areas are used for woodland or permanent pasture. A few have been cleared of trees and are cultivated. This soil is suited to corn and soybeans grown in rotation with small grain. If cultivated crops are grown, erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface, grassed waterways, and stripcropping help to prevent excessive soil loss. Slopes commonly are long enough and uniform enough for terraces and contour farming. Tilth generally is fair in the surface layer. If cultivated, the surface layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

This soil is suited to grasses and legumes for hay and pasture. Nearly all forage species are suitable. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

Many areas support native hardwoods. This soil is well suited to trees. Seedlings grow well. No major hazards or limitations affect planting or harvesting.

The land capability classification is IIIe.

163D2—Fayette silt loam, 9 to 14 percent slopes, moderately eroded. This strongly sloping, well drained soil is on narrow ridges and long, convex side slopes. Areas range from 5 to 30 acres in size and are elongated.

Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is friable silty clay loam about 35 inches thick. The upper part is dark yellowish brown and yellowish brown, and the lower part is yellowish brown and mottled. The substratum to a depth of about 60 inches is yellowish brown and strong brown, mottled silt loam. In some places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet. In other places the surface layer is brown silty clay loam.

Included with this soil in mapping are small areas of Lindley soils on the lower part of the side slopes. These soils contain more sand than the Fayette soil. They make up less than 5 percent of the unit.

Permeability is moderate in the Fayette soil, and runoff is rapid. Available water capacity is high. The content of organic matter in the surface layer is less than 0.5 percent. The subsoil typically is medium acid or strongly acid. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. A few are used for pasture. This soil is suited to row crops occasionally grown in rotation with small grain. If cultivated crops are grown, further erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface, contour stripcropping, and grassed waterways help to prevent excessive soil loss. Slopes commonly are long enough and uniform enough for terracing and farming on the contour. Tilth generally is fair in the surface layer. If cultivated, this layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent surface crusting, and increases the rate of water infiltration.

This soil is suited to grasses and legumes for hay and pasture. Nearly all forage species are suitable. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

This soil is well suited to trees. Seedlings survive and grow well. No major hazards or limitations affect planting or harvesting.

The land capability classification is IIIe.

163E—Fayette silt loam, 14 to 18 percent slopes. This moderately steep, well drained soil is on convex side slopes. Areas range from 5 to 20 acres in size and are elongated.

Typically, the surface layer is dark grayish brown, friable silt loam about 5 inches thick. The subsurface layer also is dark grayish brown, friable silt loam. It is about 6 inches thick. The subsoil is dark yellowish brown and yellowish brown, friable silty clay loam about 44 inches thick. It is mottled in the lower part. The substratum to a depth of about 60 inches is yellowish brown silt loam mottled with grayish brown. In some places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet. In other places the surface layer and subsurface layer are mixed and are lighter colored because of erosion.

Included with this soil in mapping are small areas of Lindley soils. These soils are on the lower parts of the side slopes. They make up about 5 percent of the unit.

Permeability is moderate in the Fayette soil, and runoff is rapid in cultivated areas. Available water capacity is high. The content of organic matter in the surface layer is about 0.5 to 1.0 percent. The subsoil typically is medium acid or strongly acid. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Most areas are used as woodland. Some are used as permanent pasture. This soil is poorly suited to a crop

rotation dominated by row crops but is moderately suited to row crops grown occasionally in rotation with small grain. If cultivated crops are grown, erosion is a serious hazard. A system of conservation tillage that leaves crop residue on the surface and grassed waterways help to prevent excessive soil loss. Tilth generally is fair in the surface layer. If cultivated, the surface layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

This soil is moderately suited to grasses and legumes for hay and pasture. Nearly all forage species are suitable. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

This soil is moderately well suited to trees. The hazard of erosion and the equipment limitation are moderate. Carefully selecting sites for logging trails or roads and laying out the trails or roads on the contour help to control erosion. Because of the slope, special logging equipment is needed. Also, caution is needed in operating this equipment.

The land capability classification is IVe.

163E2—Fayette silt loam, 14 to 18 percent slopes, moderately eroded. This moderately steep, well drained soil is on short, convex side slopes. Areas range from 5 to 25 acres in size and are elongated.

Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is dark yellowish brown and yellowish brown, friable silty clay loam about 47 inches thick. The substratum to a depth of about 60 inches is yellowish brown, mottled silt loam. In some places the surface layer is brown silty clay loam. In other places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet.

Included with this soil in mapping are some small areas of Keswick and Lindley soils on the lower parts of the side slopes. These soils make up about 5 percent of the unit.

Permeability is moderate in the Fayette soil, and runoff is rapid in cultivated areas. Available water capacity is high. The content of organic matter in the surface layer is less than 0.5 percent. The subsoil typically is medium acid or strongly acid. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Many areas are used for cultivated crops. A few are used for pasture. This soil is poorly suited to a crop rotation dominated by row crops but is moderately suited to row crops grown occasionally in rotation with small grain. If cultivated crops are grown, further erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface and grassed waterways help to prevent excessive soil loss. Tilth generally is fair in the surface layer. If cultivated, the surface layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

This soil is moderately suited to grasses and legumes for hay and pasture. Nearly all forage species are suitable. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

This soil is moderately well suited to trees. The hazard of erosion and the equipment limitation are moderate. Carefully selecting sites for logging trails or roads and laying out the trails or roads on the contour help to control erosion. Because of the slope, special logging equipment is needed. Also, caution is needed in operating this equipment.

The land capability classification is IVe.

163F—Fayette silt loam, 18 to 25 percent slopes. This steep, well drained soil is on short, convex side slopes. Areas range from 10 to 30 acres in size and are elongated.

Typically, the surface layer is very dark grayish brown, friable silt loam about 3 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsoil is friable silty clay loam about 44 inches thick. The upper part is brown, and the lower part is yellowish brown and dark yellowish brown. The substratum to a depth of about 60 inches is yellowish brown silt loam mottled with grayish brown. In some places the surface layer is dark grayish brown silt loam about 7 inches thick. In other places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet.

Included with this soil in mapping are small areas of Lindley soils on the lower part of the slopes. These soils contain more sand than the Fayette soil and have some pebbles. They make up about 5 percent of the unit.

Permeability is moderate in the Fayette soil, and runoff is rapid. Available water capacity is high. The content of organic matter in the surface layer is less than 1 percent. The subsoil typically is medium acid or strongly acid. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Most areas support native hardwoods. Some are used as permanent pasture. Because of the slope and a severe hazard of erosion, this soil generally is unsuited

to cultivated crops. It is moderately suited to hay. Operating farm machinery is difficult because of the slope and because of gullies and waterways.

A cover of pasture plants is effective in controlling erosion. Nearly all forage species are suitable. Overgrazing or grazing when the soil is too wet causes surface compaction and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

This soil is moderately well suited to trees. The hazard of erosion and the equipment limitation are moderate. Carefully selecting sites for logging trails or roads and laying out the trails or roads on the contour help to control erosion. Because of the slope, special logging equipment is needed. Also, caution is needed in operating this equipment.

The land capability classification is VIe.

164—Traer silt loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is in plane or depressional areas on uplands. Areas are irregular in shape and range mainly from 10 to 40 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is grayish brown, friable silt loam about 4 inches thick. The subsoil to a depth of about 60 inches is silty clay loam. The upper part is mottled olive, dark grayish brown, and grayish brown and is firm; the next part is olive, mottled, and friable; and the lower part is mottled olive, olive gray, and yellowish brown and is friable. In places sandy loam or loamy sand is at a depth of 4 to 8 feet.

Permeability and runoff are slow. Available water capacity is high. This soil has a seasonal high water table. The shrink-swell potential is high in the subsoil. The content of organic matter in the surface layer is 1 to 2 percent. The subsoil is very strongly acid or strongly acid. It generally has a medium supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. If drained, this soil is moderately suited to corn, soybeans, and small grain. The high water table is the main limitation. Some areas are ponded for short periods. As a result, crops are destroyed in some years. Tile drains do not function well because the soil is slowly permeable. Surface drains are needed to remove surface water from some areas. The soil puddles if worked when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is moderately suited to grasses and legumes for hay and pasture. The suitable forage species are limited to those mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy. Overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production.

This soil is poorly suited to trees. The main management concerns are the equipment limitation, the windthrow hazard, and seedling mortality. Because of the poor drainage, equipment should be used only during the drier periods or during the winter, when the ground is frozen. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate. A harvesting system that does not isolate the remaining trees or leave them widely spaced reduces the windthrow hazard.

The land capability classification is IIIw.

165—Stronghurst silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on broad upland divides. Areas are irregular in shape and range mainly from 5 to 50 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 6 inches thick. The subsurface layer also is dark grayish brown, friable silt loam. It is about 8 inches thick. The subsoil is friable silty clay loam about 34 inches thick. The upper part is brown; the next part is grayish brown, brown, and yellowish brown and is mottled; and the lower part is light brownish gray and mottled. The substratum to a depth of about 60 inches is light brownish gray, mottled silt loam. In places the subsoil is grayer and has more clay. In a few areas it is browner. In some areas sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet.

Permeability is moderate, and runoff is slow. Available water capacity is high. This soil has a seasonal high water table. The content of organic matter in the surface layer is 1 to 2 percent. The subsoil is medium acid or strongly acid in the upper and middle parts. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain. A system of conservation tillage that leaves crop residue on the surface helps to prevent excessive soil loss. Tile drains are needed to improve the timeliness of fieldwork in wet years. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to maintain good tilth.

If this soil is used for pasture, overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production. Nearly all forage species grow well.

This soil is well suited to trees. No major hazards or limitations affect planting if the proper species are planted and the woodland is managed properly.

The land capability classification is IIw.

173—Hoopeston fine sandy loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on alluvial terraces along the major rivers. Areas range from 5 to 120 acres in size and are irregularly shaped.

Typically, the surface layer is very dark brown, very friable fine sandy loam about 8 inches thick. The subsurface layer is very dark grayish brown, mottled, very friable fine sandy loam about 7 inches thick. The subsoil is mottled, very friable fine sandy loam about 23 inches thick. The upper part is brown, the next part is grayish brown, and the lower part is light brownish gray. The substratum to a depth of 60 inches is multicolored fine sand. In places, the subsoil is dark brown and dark yellowish brown and the soil is not so wet.

Permeability is moderately rapid in the upper part of this soil and rapid in the lower part. Runoff is slow. Available water capacity is moderate or low. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 2 to 3 percent. The subsoil typically is slightly acid or medium acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. This soil is moderately suited to corn, soybeans, and small grain. Droughtiness is a limitation during periods of below normal rainfall. The water table is moderately high in the spring but drops rapidly during the growing season. A drainage system generally is not needed, but in some areas it improves the timeliness of fieldwork after periods of heavy rainfall. If cultivated crops are grown, wind erosion is a hazard. It can be controlled by a system of conservation tillage that leaves crop residue on the surface. Returning crop residue to the soil conserves moisture and helps to control wind erosion.

This soil is moderately suited to grasses and legumes for hay and pasture. A cover of pasture plants or hay is effective in controlling wind erosion. Overgrazing during hot, dry periods reduces the extent of the protective plant cover, which increases the susceptibility to wind erosion.

The land capability classification is IIs.

174—Bolan loam, 0 to 2 percent slopes. This nearly level, well drained soil is on stream terraces along the major rivers. Areas range from 10 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is very dark brown, friable loam about 9 inches thick. The subsurface layer is very dark grayish brown, friable loam about 7 inches thick. The subsoil is about 24 inches thick. The upper part is brown, friable loam; the next part is dark yellowish brown, friable loam; and the lower part is dark yellowish brown, very friable fine sandy loam. The substratum to a depth of about 60 inches is dark yellowish brown and yellowish brown loamy fine sand and fine sand. In some places, the surface layer is fine sandy loam and the soil is more droughty. In other places the soil has a very dark grayish brown subsoil and is wetter.

Permeability is moderate in the upper part of this soil and rapid in the lower part of the subsoil and in the substratum. Runoff is slow. Available water capacity is moderate. The content of organic matter in the surface layer is about 1 to 2 percent. The subsoil typically is neutral to medium acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Droughtiness is a limitation during periods of below normal rainfall. If cultivated crops are grown, wind erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface conserves moisture and helps to control wind erosion. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to control wind erosion and prevent deterioration of tilth.

A cover of pasture plants or hay is effective in controlling wind erosion. Nearly all forage species are suitable. Overgrazing reduces the extent of the protective plant cover, which increases the susceptibility to wind erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

The land capability classification is IIs.

174B—Bolan loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on stream terraces along the major rivers. Areas range from 5 to 40 acres in size and are irregularly shaped.

Typically, the surface layer is very dark brown, friable loam about 9 inches thick. The subsurface layer is dark brown, friable loam about 7 inches thick. The subsoil is about 20 inches thick. The upper part is brown, friable loam; the next part is dark yellowish brown, friable loam; and the lower part is dark yellowish brown, very friable fine sandy loam. The substratum to a depth of about 60 inches is dark yellowish brown and yellowish brown loamy fine sand and fine sand. In places, the surface layer is fine sandy loam and the soil is more droughty.

Permeability is moderate in the upper part of the profile and rapid in the substratum. Runoff is slow. Available water capacity is moderate. The content of organic matter in the surface layer is about 1 to 2 percent. The subsoil typically is neutral to medium acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, erosion by wind and water is a hazard. Also, droughtiness is a limitation. A system of conservation tillage that leaves crop residue on the surface helps to control erosion and conserves moisture.

Good tilth generally can be easily maintained. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to prevent excessive soil loss and deterioration of tilth.

A cover of pasture plants or hay is effective in controlling erosion. Wind erosion is a hazard, however, if overgrazing reduces the extent of the protective plant cover. Nearly all forage species are suitable. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

The land capability classification is IIe.

175—Dickinson fine sandy loam, 0 to 2 percent slopes. This nearly level, well drained soil is on stream terraces and uplands. Areas range from 5 to 80 acres in size and are irregularly shaped.

Typically, the surface layer is very dark brown, very friable fine sandy loam about 9 inches thick. The subsurface layer is very dark brown and very dark grayish brown, very friable fine sandy loam about 11 inches thick. The subsoil is very friable fine sandy loam about 18 inches thick. It is dark brown in the upper part and dark yellowish brown in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown fine sand. In places the surface layer is dark brown loamy fine sand.

Included with this soil in mapping are small areas of the excessively drained Sparta and somewhat poorly drained Hoopeston soils. These soils are in positions on the landscape similar to those of the Dickinson soil. They make up 5 to 10 percent of the unit.

The Dickinson soil is moderately rapidly permeable in the upper part and rapidly permeable in the lower part. Runoff is slow. Available water capacity is moderate. The content of organic matter in the surface layer is about 1 to 2 percent. The subsoil typically is slightly acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. Some areas are used for pasture or hay. Many small areas are cropped along with larger areas of adjacent soils that are better suited to crops. This soil is moderately suited to corn, soybeans, and small grain. Droughtiness is a limitation in most years unless rainfall is timely. Also, wind erosion is a hazard during most years. Cover crops and a system of conservation tillage that leaves crop residue on the surface help to prevent excessive soil loss and conserve moisture. The soil warms up quickly in the spring, thus stimulating early plant growth. Returning crop residue to the soil or regularly adding other organic material improves fertility and increases the available water capacity.

This soil is moderately suited to grasses and legumes for hay and pasture. The suitable forage species are limited to those mixtures that are tolerant of droughty conditions. Examples are alfalfa and smooth bromegrass or crownvetch and tall fescue. Overgrazing or grazing when the soil is too wet or too dry reduces the extent of the protective plant cover and causes deterioration of the plant community. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet or dry periods help to keep the pasture and the soil in good condition.

The land capability classification is IIs.

175B—Dickinson fine sandy loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on uplands and stream terraces. Areas range from 2 to 60 acres in size and are irregularly shaped or oval.

Typically, the surface layer is very dark brown, very friable fine sandy loam about 9 inches thick. The subsurface layer is dark brown, friable fine sandy loam about 8 inches thick. The subsoil is about 18 inches thick. The upper part is brown, very friable fine sandy loam, and the lower part is dark yellowish brown, very friable loamy fine sand. The substratum to a depth of about 60 inches is dark yellowish brown fine sand. In places the surface layer is dark brown loamy sand.

Included with this soil in mapping are small areas of the excessively drained Sparta soils. These soils are in positions on the landscape similar to those of the Dickinson soil. They make up about 5 percent of the unit.

The Dickinson soil is moderately rapidly permeable in the upper part and rapidly permeable in the lower part. Runoff is medium. Available water capacity is moderate. The content of organic matter in the surface layer is about 1.0 to 1.5 percent. The subsoil typically is slightly acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. Some are used for pasture or hay. Many small areas are cropped along with larger areas of adjacent soils that are better suited to crops. This soil is moderately suited to corn, soybeans, and small grain. Droughtiness is a limitation in most years unless rainfall is timely. If cultivated crops are grown, wind erosion is a hazard. Windblown sand grains sometimes damage newly seeded crops on this soil and on the adjoining soils unless the surface is protected by a plant cover. A system of conservation tillage that leaves crop residue on the surface, cover crops, and grassed waterways help to prevent excessive soil loss. The soil is poorly suited to terracing because ridging the moderately coarse textured material is difficult and because the underlying coarse textured material is too close to the surface. If terraces are built, cuts should not expose the coarse textured material in terrace channels. The soil warms up quickly in the spring, thus stimulating early plant growth. Returning crop residue to the soil or regularly adding other organic material improves fertility and increases the available water capacity.

This soil is moderately suited to grasses and legumes for hay and pasture. It is suitable for drought-tolerant

mixtures, such as alfalfa and smooth bromegrass or crownvetch and tall fescue. A cover of hay or pasture plants is effective in controlling erosion. Overgrazing reduces the extent of the protective plant cover and causes deterioration of the plant community. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during excessively wet or dry periods help to keep the pasture and the soil in good condition.

The land capability classification is IIe.

179D2—Gara loam, 9 to 14 percent slopes, moderately eroded. This strongly sloping, well drained soil is on the sides and convex tops of ridges in the uplands. Areas range from 5 to 25 acres in size and are irregularly shaped.

Typically, the surface layer is very dark gray and very dark grayish brown, friable loam about 7 inches thick. Plowing has mixed streaks and pockets of brown subsoil material with the surface layer. The subsoil is clay loam about 40 inches thick. It is mottled. The upper part is brown and yellowish brown and is friable, and the lower part is dark yellowish brown and yellowish brown and is firm. The substratum to a depth of about 60 inches is mottled yellowish brown and dark yellowish brown clay loam. In places the surface layer is thicker or darker.

Included with this soil in mapping are areas of the poorly drained Rinda soils on the upper parts of the landscape. These soils have a subsoil of gray clay. They make up about 5 to 10 percent of the unit.

Permeability is moderately slow in the Gara soil, and runoff is rapid. Available water capacity is high. The content of organic matter in the surface layer is about 0.5 to 1.5 percent. The subsoil typically is medium acid or strongly acid in the upper part. It generally has a low supply of available phosphorus and a very low supply of available potassium.

Many areas are used for cultivated crops. Some are used for pasture or hay. Nearly all were cultivated at some time in the past. This soil is poorly suited to corn, soybeans, and small grain. It is better suited to row crops grown occasionally in rotation with hay and pasture. If cultivated crops are grown, further erosion is a moderate hazard. If row crops are grown in most years, soil losses are severe. A system of conservation tillage that leaves crop residue on the surface, terraces, and contour farming help to prevent excessive erosion. Tilth generally is fair in the surface layer. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is moderately suited to grasses and legumes for hay and pasture. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

This soil is well suited to trees. The hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IVe.

180—Keomah silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on the moderately wide or wide tops of upland ridges on the major stream divides. Areas range from 5 to 100 acres in size and are irregularly shaped.

Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. The subsurface layer is brown, mottled, friable silt loam about 5 inches thick. The subsoil is friable and firm, mottled silty clay loam and silty clay about 34 inches thick. The upper part is yellowish brown, the next part is grayish brown, and the lower part is light brownish gray. The substratum to a depth of about 60 inches is light brownish gray, mottled silty clay loam.

Included with this soil in mapping are areas of the poorly drained Traer soils. These soils are on the plane or slightly depressional parts of the landscape. They make up about 2 to 6 percent of the unit.

Permeability is moderately slow in the Keomah soil, and runoff is slow or very slow. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 1 to 2 percent. The shrink-swell potential is high. The subsoil typically is slightly acid to strongly acid. It generally has a medium supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, a drainage system is needed. Tile drains reduce the wetness. Good tilth generally can be easily maintained. The soil puddles if worked wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting and deterioration of tilth, and increases the rate of water infiltration.

If this soil is used for pasture, overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production. Most forage species are suitable if the soil is drained.

A few areas support native hardwoods. This soil is well suited to trees. The hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIw.

208—Klum fine sandy loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on flood plains along rivers and the major streams. It is subject to flooding. Areas range from 5 to 50 acres in size and are elongated or irregularly shaped.

Typically, the surface layer is dark brown, friable fine sandy loam about 8 inches thick. The substratum is about 39 inches thick. It is stratified dark grayish brown, grayish brown, pale brown, light yellowish brown,

yellowish brown, brown, dark brown, dark gray, and black sandy loam, coarse sand, sand, fine sand, and silt loam. Below this to a depth of 60 inches is very dark gray silty clay loam. In places the surface layer is loamy sand or sand.

Included with this soil in mapping are scattered small areas of the somewhat poorly drained Lawson soils. These soils contain more clay and more organic matter than the Klum soil. They make up about 5 to 10 percent of the unit.

Permeability is moderately rapid in the Klum soil, and runoff is slow. Available water capacity is moderate to very low. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 1.0 to 1.5 percent. The substratum typically is neutral in reaction. It generally has a very low supply of available phosphorus and potassium.

Many areas are used for cultivated crops. Some are wooded or pastured. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Wind erosion and flooding are hazards. Also, the soil is droughty. Levees or dikes along stream channels help to control the floodwater. A system of conservation tillage that leaves crop residue on the surface conserves moisture and helps to control wind erosion. Good tilth generally can be easily maintained. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to prevent excessive erosion, surface crusting, and deterioration of tilth.

A cover of pasture plants or hay is effective in controlling wind erosion. Nearly all forage species are suitable. Overgrazing, particularly during hot, dry periods, reduces the extent of the protective plant cover and thus increases the susceptibility to wind erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

The land capability classification is IIIw.

220—Nodaway silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil is in areas of recently deposited alluvium on bottom land. It is subject to flooding. Areas are irregularly shaped. They generally range from 5 to 100 acres in size, but some are as large as 300 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 7 inches thick. The substratum to a depth of about 60 inches is dark grayish brown, brown, light brownish gray, and very dark grayish brown, stratified silt loam. In places dark silty clay loam is within a depth of 36 inches.

Included with this soil in mapping are some small areas of the moderately well drained Klum soils. These soils are at elevations similar to those of the Nodaway soil. They contain more sand throughout the surface layer and substratum than the Nodaway soil. They make up less than 10 percent of the unit.

Permeability is moderate in the Nodaway soil, and runoff is slow. Available water capacity is high or very high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 1 to 2 percent. Reaction typically is neutral throughout the profile. The substratum generally has a medium supply of available phosphorus and a very low supply of available potassium.

Many areas are used for cultivated crops. Some are pastured or wooded. This soil is well suited to corn, soybeans, and small grain. The flooding and the seasonal high water table are management concerns. Measures that reduce the wetness improve the timeliness of fieldwork. Good tilth generally can be easily maintained. The soil crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material helps to maintain tilth, improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. Overgrazing reduces forage production.

A few areas support native hardwoods. This soil is well suited to trees. Seedlings survive and grow well. The hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIw.

223C2—Rinda silty clay loam, 5 to 9 percent slopes, moderately eroded. This moderately sloping, poorly drained soil is on convex or plane side slopes and in coves at the head of upland drainageways. Areas range from 5 to 10 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silty clay loam about 7 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The upper part of the subsoil is mottled grayish brown and brown, friable silty clay loam. The lower part to a depth of about 60 inches is grayish brown, gray, and dark gray, mottled, firm clay. In some places the surface layer is lighter colored and contains less organic matter. In other places it is thicker and darker and contains more organic matter.

Included with this soil in mapping are areas of the moderately well drained Hedrick soils on the upper slopes. These soils have a subsoil that contains less clay than that of the Rinda soil. They make up about 5 to 10 percent of the unit.

Permeability is very slow in the Rinda soil, and runoff is medium. Available water capacity is moderate. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 1 to 2 percent. The shrink-swell potential is high. The subsoil typically is medium acid or strongly acid. It generally has

a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops or have been cultivated in the past. Some are used for hay or pasture. This soil generally is farmed along with the adjoining soils. It is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, wetness is a very serious limitation and further erosion is a severe hazard. A system of conservation tillage that leaves crop residue on the surface helps to prevent excessive soil loss. Installing interceptor tile in the more permeable soils upslope reduces the wetness in many areas of this soil. Tilth generally is fair in the surface layer. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is moderately suited to grasses and legumes for hay and pasture. Such forage species as tall fescue and orchardgrass grow well. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

Very few areas support native hardwoods. This soil is poorly suited to trees because of the wetness. The main management concerns are the equipment limitation, seedling mortality, and the windthrow hazard. Logging equipment should be used only during the drier periods or during the winter, when the ground is frozen. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate. A harvesting system that does not isolate the remaining trees or leave them widely spaced reduces the windthrow hazard.

The land capability classification is IVw.

223D2—Rinda silty clay loam, 9 to 14 percent slopes, moderately eroded. This strongly sloping, poorly drained soil is on convex or plane side slopes and in coves at the head of upland drainageways. Areas range from 5 to 15 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silty clay loam about 8 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil extends to a depth of about 60 inches. It is mottled. The upper part is brown and grayish brown, friable silty clay loam, and the lower part is grayish brown and gray, firm clay. In some places the surface layer is brown and contains less organic matter. In other places it is thicker, is darker, and contains more organic matter.

Included with this soil in mapping are areas of the moderately well drained Hedrick soils on the upper slopes. These soils are not so steep as the Rinda soil. They have a subsoil that contains less clay than that of the Rinda soil. They make up about 5 to 10 percent of the unit.

Permeability is very slow in the Rinda soil, and runoff is rapid. Available water capacity is moderate. This soil has a seasonal high water table. The content of organic matter in the surface layer is about 1.0 to 1.5 percent. The shrink-swell potential is high. The subsoil typically is medium acid or strongly acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for hay and pasture. Areas of this soil are generally so small that they are farmed along with the adjoining soils. The soil is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a very severe hazard and wetness is a serious limitation. A system of conservation tillage that leaves crop residue on the surface helps to prevent excessive soil loss. Installing interceptor tile in the more permeable soils upslope reduces the wetness in many areas. Tilth generally is fair in the surface layer. The soil puddles if worked when wet. It crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is moderately suited to grasses and legumes for hay and pasture. Such forage species as tall fescue and orchardgrass grow well. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

Very few areas support native hardwoods. This soil is poorly suited to trees because of the wetness. The main management concerns are the equipment limitation, seedling mortality, and the windthrow hazard. Logging equipment should be used only during the drier periods or during the winter, when the ground is frozen. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate. A harvesting system that does not isolate the remaining trees or leave them widely spaced reduces the windthrow hazard.

The land capability classification is IVe.

273B—Olmitz loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on slightly concave or plane foot slopes and at or near outlets of upland drainageways. Areas are irregular in shape and range mainly from 5 to 20 acres in size.

Typically, the surface layer is dark brown, friable loam about 10 inches thick. The subsurface layer is very dark grayish brown, friable loam about 26 inches thick. The subsoil to a depth of about 60 inches is clay loam. The upper part is brown and dark brown, is mottled, and is friable, and the lower part is very dark grayish brown. In

places the surface layer is light colored loamy, sandy, or silty recent alluvium about 7 to 15 inches thick.

Included with this soil in mapping are somewhat poorly drained soils. Also included are soils that are lighter colored than the Olmitz soil. Included soils are generally on the lower part of the slopes. They make up about 5 to 10 percent of the unit.

Permeability is moderate in the Olmitz soil, and runoff is medium. Available water capacity is high. The content of organic matter is 1 to 3 percent in the surface layer. The subsoil is neutral in reaction. It has a very low supply of available phosphorus and a low supply of available potassium.

Many areas are used for cultivated crops. Some areas are used for hay and pasture. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, erosion is a hazard. Also, the soil receives runoff from the adjoining steeper slopes. Diversion terraces help to control this runoff. A conservation tillage system that leaves crop residue on the surface, contour farming, and terraces help to control erosion. Returning crop residue to the soil improves fertility and helps to prevent deterioration of tilth.

This soil is moderately suited to grasses and legumes for hay and pasture. A cover of hay or pasture plants is effective in controlling erosion. Overgrazing causes surface compaction and thus increases the runoff rate and the susceptibility to erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

The land capability classification is IIe.

273C—Olmitz loam, 5 to 9 percent slopes. This moderately sloping, moderately well drained soil is on convex or plane foot slopes and at or near outlets of upland drainageways. Areas are irregular in shape and range mainly from 10 to 40 acres in size.

Typically, the surface layer is dark brown, friable loam about 10 inches thick. The subsurface layer is very dark grayish brown, friable loam and clay loam about 22 inches thick. The subsoil to a depth of about 60 inches is friable clay loam. The upper part is dark brown and brown and is mottled, and the lower part is very dark grayish brown. In places the surface layer is light colored, loamy, sandy, or silty recent alluvium.

Permeability is moderate, and runoff is medium. Available water capacity is high. The content of organic matter is 1 to 3 percent in the surface layer. The subsoil is generally neutral in reaction. It has a very low supply of available phosphorus and a low supply of available potassium.

Many areas are used for cultivated crops. Some are used for hay and pasture. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, erosion is a severe hazard. Also, the soil receives runoff from the adjoining higher slopes. Diversion terraces help to control this runoff. A conservation tillage system that leaves crop residue on the surface, contour farming, and terraces help to control erosion. Returning crop residue to the soil improves fertility and helps to prevent deterioration of tilth.

This soil is moderately suited to grasses and legumes for hay and pasture. Overgrazing causes surface compaction and thus increases the runoff rate and the susceptibility to erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

The land capability classification is IIIe.

279—Taintor silty clay loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is on broad upland divides. Areas range from 5 to 200 acres in size and are irregularly shaped.

Typically, the surface layer is black, friable silty clay loam about 8 inches thick. The subsurface layer is black and very dark gray, mottled silty clay loam about 15 inches thick. The upper part is friable, and the lower part is firm. The subsoil is olive gray, mottled, firm silty clay loam about 27 inches thick. The substratum to a depth of about 60 inches is olive gray, mottled silty clay loam.

Included with this soil in mapping are small areas of Mahaska and Sperry soils. The somewhat poorly drained Mahaska soils are on slight rises. The very poorly drained Sperry soils are in scattered depressions where water tends to pond. Included soils make up less than 10 percent of the unit.

Permeability is moderately slow in the Taintor soil, and runoff is slow. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 4 to 5 percent. The shrink-swell potential is high. The subsoil typically is medium acid or slightly acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If the soil is drained, row crops can be grown in most years. A drainage system reduces the wetness and provides aeration and a deep root zone for plants. Tile drains generally function satisfactorily, but in some areas suitable outlets are not available. Tilth generally is fair in the surface layer. Returning crop residue to the soil and deferring tillage when the soil is wet improve tilth.

If this soil is used for pasture, overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production. Forage mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy, should be selected for planting.

The land capability classification is IIw.

280—Mahaska silty clay loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on narrow flats and on the moderately wide or wide

tops of ridges in the uplands. Areas range from 10 to 120 acres in size and are irregularly shaped.

Typically, the surface layer is black, friable silty clay loam about 8 inches thick. The subsurface layer is very dark gray and very dark grayish brown, friable silty clay loam about 11 inches thick. The subsoil to a depth of about 60 inches is mottled silty clay loam. It is dark grayish brown and firm in the upper part and grayish brown and friable in the lower part.

Included with this soil in mapping are some areas of the very poorly drained Sperry and poorly drained Taintor soils on small flats. These soils make up less than 5 percent of the unit.

Permeability is moderate in the Mahaska soil, and runoff is slow. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 3 to 4 percent. The subsoil typically is medium acid or slightly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Most areas are cultivated. This soil is well suited to corn, soybeans, and small grain. Row crops can be grown in most years. Most areas are adequately drained. In some areas, however, tile drains are needed to improve the timeliness of fieldwork in wet years. If cultivated, some areas are subject to erosion. Good tilth generally can be easily maintained. Returning crop residue to the soil and delaying fieldwork when the soil is wet help to prevent deterioration of tilth.

This soil is well suited to most grasses and legumes for hay and pasture. Overgrazing or grazing when the soil is wet, however, causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

The land capability classification is I.

280B—Mahaska silty clay loam, 2 to 5 percent slopes. This gently sloping, somewhat poorly drained soil is on the sides and narrow tops of ridges in the uplands. Areas range from 10 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is very dark brown, friable silty clay loam about 10 inches thick. The subsurface layer is very dark grayish brown, friable silty clay loam about 10 inches thick. The subsoil to a depth of about 60 inches is mottled silty clay loam. The upper part is dark grayish brown and firm, and the lower part is grayish brown and friable.

Included with this soil in mapping are some areas of the poorly drained Taintor soils on small flats. These soils make up less than 5 percent of the unit.

Permeability is moderate in the Mahaska soil, and runoff is slow. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 3 to 4 percent. The subsoil typically is medium acid or slightly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Erosion is a hazard in cultivated areas. A system of conservation tillage that leaves crop residue on the surface, contour farming, and terraces help to prevent excessive soil loss. In places, however, farming on the contour and terracing are difficult because of short, irregular slopes. In some areas tile drains are needed to improve the timeliness of fieldwork in wet years. Good tilth generally can be easily maintained. Returning crop residue to the soil and delaying fieldwork when the soil is wet help to prevent deterioration of tilth.

A cover of pasture plants or hay is effective in controlling erosion. Most forage species are suitable. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

The land capability classification is IIe.

281B—Otley silty clay loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on the sides and convex tops of ridges in the uplands. It is generally adjacent to broad flats. Areas range from 5 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is black, friable silty clay loam about 8 inches thick. The subsurface layer is very dark brown and very dark grayish brown, friable silty clay loam about 10 inches thick. The subsoil to a depth of about 60 inches is mottled, friable and firm silty clay loam. The upper part is dark yellowish brown, and the lower part is yellowish brown.

Included with this soil in mapping are small areas of the nearly level, somewhat poorly drained Mahaska soils. These soils make up less than 5 percent of the unit.

Permeability is moderate in the Otley soil, and runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 2.5 to 3.5 percent. The shrink-swell potential is high. The subsoil typically is slightly acid or medium acid in the upper part. It generally has a low supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, erosion is a moderate hazard. A system of conservation tillage that leaves crop residue on the surface, contour farming, and terraces help to prevent excessive soil loss. In places, however, farming on the contour and terracing are difficult because of short, irregular slopes. Good tilth generally can be easily maintained. Returning crop residue to the soil or

regularly adding other organic material improves fertility and helps to prevent deterioration of tilth.

A cover of pasture plants or hay is effective in controlling erosion. Most forage species are suitable. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

The land capability classification is IIe.

281C2—Otley silty clay loam, 5 to 9 percent slopes, moderately eroded. This moderately sloping, moderately well drained soil is on the sides and narrow tops of loess-covered ridges in the uplands. Areas range from 5 to 40 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silty clay loam about 8 inches thick. Plowing has mixed streaks and pockets of dark yellowish brown subsoil material with the surface layer. The subsoil is silty clay loam about 45 inches thick. The upper part is yellowish brown and firm; the next part is yellowish brown, mottled, and firm; and the lower part is yellowish brown and light olive brown, is mottled, and is friable. The substratum to a depth of about 60 inches is yellowish brown, mottled silty clay loam.

Included with this soil in mapping are areas of Nira soils at the head of drainageways and on the lower side slopes. The subsoil of these soils is grayer in the lower part than that of the Otley soil. Also, it has a lower content of available phosphorus. These soils make up about 5 to 10 percent of the unit.

Permeability is moderate in the Otley soil, and runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 1.5 to 2.5 percent. The shrink-swell potential is high. The subsoil typically is slightly acid or medium acid in the upper part. It generally has a low supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. Some are used for hay or pasture. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface during the winter, contour farming, and terraces help to prevent excessive soil loss. In places, however, farming on the contour and terracing are difficult because of short, irregular slopes. Tilth generally is fair in the surface layer. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

The land capability classification is IIIe.

291—Atterberry silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on broad ridgetops and divides in the uplands. Areas range from 5 to 40 acres in size and are irregularly shaped.

Typically, the surface layer is very dark gray, friable silt loam about 9 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 4 inches thick. The subsoil is mottled, friable silty clay loam about 38 inches thick. The upper part is dark yellowish brown and yellowish brown, and the lower part is light brownish gray. The substratum to a depth of about 60 inches is mottled yellowish brown and light brownish gray silt loam. In places sand, loamy sand, or sandy loam is at a depth of 4 to 8 feet.

Included with this soil in mapping are small areas of the poorly drained Walford soils. These soils are in the slightly lower areas or in depressions. Also included are small areas where the slope is more than 2 percent. These areas are subject to erosion. Included soils make up less than 5 percent of the unit.

Permeability is moderate in the Atterberry soil, and runoff is slow. Available water capacity is high or very high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 2 to 3 percent. Reaction is medium acid. The subsoil generally has a medium supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain. Most areas are adequately drained. In some areas, however, tile drains are needed to improve the timeliness of fieldwork in wet years. They function satisfactorily if suitable outlets are available. If cultivated, some areas are subject to erosion. The surface layer tends to crust after hard rains. It puddles if tilled when wet. Good tilth generally can be easily maintained. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. Overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting if the proper species are selected for planting and the woodland is managed properly.

The land capability classification is I.

293C—Chelsea-Lamont-Fayette complex, 5 to 9 percent slopes. These moderately sloping soils are in the uplands. The excessively drained Chelsea and well drained Lamont soils are on side slopes, and the well drained Fayette soil is on ridgetops. Areas range from 5 to 40 acres in size and are irregular in shape. They are about 35 percent Chelsea soil, 35 percent Lamont soil, and 30 percent Fayette soil. The three soils occur as

areas so intricately mixed or so small that mapping them separately is impractical.

Typically, the Chelsea soil has a surface layer of dark grayish brown, very friable loamy fine sand about 6 inches thick. The subsurface layer is brown, very friable sand about 15 inches thick. Below this to a depth of about 60 inches is yellowish brown sand that has bands of brown and dark brown sandy loam and loamy sand 0.25 inch to 2.0 inches thick.

Typically, the Lamont soil has a surface layer of dark grayish brown, very friable fine sandy loam about 7 inches thick. The subsoil to a depth of about 60 inches is brown and yellowish brown, very friable fine sandy loam.

Typically, the Fayette soil has a surface layer of dark grayish brown, friable silt loam about 7 inches thick. The subsurface layer also is dark grayish brown, friable silt loam. It is about 4 inches thick. The subsoil is about 44 inches thick. It is friable. The upper part is brown silt loam, the next part is yellowish brown silty clay loam, and the lower part is yellowish brown and strong brown sandy loam and loamy sand. The substratum to a depth of about 60 inches is light olive brown and reddish brown loamy fine sand.

The Chelsea soil is rapidly permeable, the Lamont soil is moderately rapidly permeable, and the Fayette soil is moderately permeable. Runoff is medium on all three soils. Available water capacity is low in the Chelsea soil, moderate in the Lamont soil, and high in the Fayette soil. The content of organic matter is less than 0.5 percent in the surface layer of the Chelsea and Lamont soils and is 1.0 to 1.5 percent in the surface layer of the Fayette soil. The subsurface layer of the Chelsea soil is slightly acid to strongly acid. The subsoil of the Lamont and Fayette soils is medium acid or strongly acid. The supply of available phosphorus generally is very low in the subsurface layer of the Chelsea soil, low in the subsoil of the Lamont soil, and high in the subsoil of the Fayette soil. The supply of available potassium generally is low in the subsurface layer of the Chelsea soil and very low in the subsoil of the Lamont and Fayette soils.

Most areas are used for row crops. These soils are poorly suited to corn, soybeans, and small grain. Yields are low unless rainfall is above average and timely. Erosion by wind and water is a hazard in cultivated areas. It can be controlled by a system of conservation tillage that leaves crop residue on the surface, contour farming, winter cover crops, and grassed waterways. Because of instability, constructing and maintaining terraces may be difficult. Returning crop residue to the soil or adding other organic material helps to maintain fertility and reduces the susceptibility to erosion.

These soils are moderately suited to grasses and legumes for hay and pasture. A cover of grasses and legumes is effective in controlling wind erosion and water erosion. Because the Chelsea soil is excessively drained, the forage species selected for planting should be limited to those that are tolerant of dry conditions. Examples are alfalfa, smooth bromegrass, crownvetch, and tall fescue. The growth of pasture plants and hay is very limited during hot, dry periods. Restricted grazing and equipment use during dry periods can prevent excessive damage to the plant cover, which increases the susceptibility to wind erosion. Pasture rotation is needed.

These soils are well suited to trees. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate.

The land capability classification is IIIe.

293E—Chelsea-Lamont-Fayette complex, 9 to 18 percent slopes. These strongly sloping and moderately steep soils are in the uplands. The excessively drained Chelsea and well drained Lamont soils are on side slopes, and the well drained Fayette soil is on ridgetops. Areas range from 5 to 40 acres in size and are irregular in shape. They are about 45 percent Chelsea soil, 30 percent Lamont soil, and 25 percent Fayette soil. The three soils occur as areas so intricately mixed or so small that mapping them separately is impractical.

Typically, the Chelsea soil has a surface layer of dark brown, very friable loamy fine sand about 3 inches thick. The subsurface layer is brown, very friable sand about 28 inches thick. Below this to a depth of about 60 inches is yellowish brown sand that has bands of brown loamy sand 0.25 inch to 2.0 inches thick.

Typically, the Lamont soil has a surface layer of dark grayish brown, very friable fine sandy loam about 4 inches thick. The subsoil to a depth of about 60 inches is brown and yellowish brown, very friable fine sandy loam.

Typically, the Fayette soil has a surface layer of very dark grayish brown, friable silt loam about 4 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 6 inches thick. The subsoil is about 40 inches thick. It is friable. The upper part is brown silt loam, the next part is yellowish brown silty clay loam, and the lower part is yellowish brown and strong brown sandy loam and loamy sand. The substratum to a depth of about 60 inches is light olive brown and reddish brown loamy fine sand. In places the surface layer is darker and thicker.

The Chelsea soil is rapidly permeable, the Lamont soil is moderately rapidly permeable, and the Fayette soil is moderately permeable. Runoff is rapid on all three soils. Available water capacity is low in the Chelsea soil, moderate in the Lamont soil, and high in the Fayette soil. The content of organic matter is less than 0.5 percent in the surface layer of the Chelsea and Lamont soils and is 0.5 to 1.0 percent in the surface layer of the Fayette soil. The subsurface layer of the Chelsea soil is slightly acid

to strongly acid. The subsoil of the Lamont and Fayette soils is medium acid or strongly acid. The supply of available phosphorus generally is very low in the subsurface layer of the Chelsea soil, low in the subsoil of the Lamont soil, and high in the subsoil of the Fayette soil. The supply of available potassium generally is low in the subsurface layer of the Chelsea soil and very low in the subsoil of the Lamont and Fayette soils.

Most areas are used for pasture and hay. These soils are unsuited to corn, soybeans, and small grain. Yields are very low, and erosion is a severe hazard if row crops are grown.

These soils are moderately suited to grasses and legumes for hay and pasture. A cover of grasses and legumes is effective in controlling wind erosion and water erosion. Because the Chelsea soil is excessively drained, the forage species selected for planting should be limited to those that are tolerant of dry conditions. Examples are alfalfa, smooth bromegrass, crownvetch, and tall fescue. The growth of pasture plants and hay is restricted during hot, dry periods. Operating ordinary farm machinery is difficult and hazardous because of the slope. Restricted grazing and equipment use during dry periods can prevent excessive damage to the plant cover, which increases the susceptibility to wind erosion. Pasture rotation is needed.

These soils are moderately suited to trees. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate. Because of the slope, special logging equipment is needed. Also, caution is needed in operating this equipment.

The land capability classification is VIe.

352B—Whittier silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops and side slopes in the uplands and on stream terraces. Areas are irregular in shape and range mainly from 5 to 60 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsoil is about 31 inches thick. The upper part is dark yellowish brown and yellowish brown, friable silty clay loam, and the lower part is yellowish brown, very friable sandy loam. The substratum to a depth of about 60 inches is brownish yellow loamy sand. In places the depth to sandy material is more than 60 inches.

Included with this soil in mapping are scattered areas of soils that have sand within a depth of 20 inches. These soils are more droughty than the Whittier soil. They make up 5 to 10 percent of the unit.

The Whittier soil is moderately permeable in the upper part and rapidly permeable in the lower part. Runoff is medium. Available water capacity is moderate. The content of organic matter is 2 to 3 percent in the surface layer. The subsoil is slightly acid or medium acid. It generally has a low supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, erosion is a hazard. It can be controlled by contour farming and a system of conservation tillage that leaves crop residue on the surface. In places farming on the contour and terracing are difficult because of short, irregular slopes. Terracing can expose the coarse textured, droughty substratum. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of hay or pasture plants is effective in controlling erosion. Restricted grazing and equipment use during wet periods can prevent excessive surface compaction, which results in poor tilth and excessive runoff.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

The land capability classification is IIe.

352C2—Whittier silt loam, 5 to 9 percent slopes, moderately eroded. This moderately sloping, well drained soil is on narrow ridges and convex side slopes in the uplands and on stream terraces. Areas are irregular in shape and range mainly from 5 to 40 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 8 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is about 28 inches thick. The upper part is dark yellowish brown and yellowish brown, friable silty clay loam, and the lower part is yellowish brown, very friable sandy loam. The substratum to a depth of about 60 inches is brownish yellow loamy sand. In some places the depth to sandy material is more than 60 inches. In other places the surface layer is lighter colored or thinner and contains less organic matter.

Included with this soil in mapping are scattered areas of soils that have sand within a depth of 20 inches. These soils are more droughty than the Whittier soil. They make up 5 to 10 percent of the unit.

The Whittier soil is moderately permeable in the upper part and rapidly permeable in the lower part. Runoff is medium. Available water capacity is moderate. The content of organic matter is 0.5 to 1.5 percent in the surface layer. The subsoil is slightly acid or medium acid. It generally has a low supply of available phosphorus and a very low supply of available potassium.

Most areas are used for row crops. This soil is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a severe hazard. It can be controlled by contour farming and a system of conservation tillage that leaves crop residue on the

surface. In places farming on the contour and terracing are difficult because of short, irregular slopes. Terracing can expose the coarse textured, droughty substratum. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is moderately suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of hay or pasture plants is effective in controlling erosion. Restricted grazing and equipment use during wet periods can prevent excessive surface compaction, which results in poor tilth and excessive runoff. Maintaining a permanent cover of pasture plants slowly increases the organic matter content of this moderately eroded soil. Pasture rotation is needed.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

The land capability classification is IIIe.

352D2—Whittier silt loam, 9 to 14 percent slopes, moderately eroded. This strongly sloping, well drained soil is on narrow ridges and convex side slopes in the uplands and on stream terraces. Areas are irregular in shape and range mainly from 4 to 30 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 8 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is about 26 inches thick. The upper part is dark yellowish brown and yellowish brown, friable silty clay loam, and the lower part is yellowish brown, very friable sandy loam. The substratum to a depth of about 60 inches is brownish yellow loamy sand. In some places the depth to sandy material is more than 60 inches. In other places the surface layer is lighter colored or thinner and contains less organic matter.

Included with this soil in mapping are scattered areas of soils that have sand within a depth of 20 inches. These soils are more droughty than the Whittier soil. They make up 5 to 10 percent of the unit.

The Whittier soil is moderately permeable in the upper part and rapidly permeable in the lower part. Runoff is rapid. Available water capacity is moderate. The content of organic matter is 0.5 to 1.5 percent in the surface layer. The subsoil is slightly acid or medium acid. It generally has a low supply of available phosphorus and a very low supply of available potassium.

Most areas are used for row crops. This soil is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a severe hazard. It can be controlled by contour farming and a system of conservation tillage that leaves crop residue on the surface. In places farming on the contour and terracing are difficult because of short, irregular slopes. Terracing can expose the coarse textured, droughty substratum. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is moderately suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of hay or pasture plants is effective in controlling erosion. Maintaining a permanent cover of pasture plants slowly increases the organic matter content of this moderately eroded soil. Pasture rotation is needed.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

The land capability classification is IVe.

353C2—Tell silt loam, 5 to 9 percent slopes, moderately eroded. This moderately sloping, well drained soil is on narrow ridges and convex side slopes in the uplands. Areas are irregular in shape and range mainly from 5 to 40 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is about 42 inches thick. The upper part is yellowish brown, mottled, friable silty clay loam; the next part is brown, mottled, friable sandy clay loam; and the lower part is yellowish brown, very friable loamy sand. The substratum to a depth of about 60 inches is yellowish brown, mottled loamy sand. In some places the depth to sandy material is more than 60 inches. In other places the surface layer is thinner, is lighter in color, and contains less organic matter.

Permeability is moderate in the upper part of this soil and rapid in the lower part. Runoff is medium. Available water capacity is moderate. The content of organic matter is less than 0.5 percent in the surface layer. The subsoil is slightly acid to strongly acid. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Most areas are used for row crops. This soil is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a severe hazard. It can be controlled by contour farming and a system of conservation tillage that leaves crop residue on the surface. In places farming on the contour and terracing are difficult because of short, irregular slopes. Terracing can expose the coarse textured, droughty substratum. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is moderately suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of hay or pasture plants is effective in controlling erosion. Restricted grazing or equipment use during wet periods can prevent excessive surface compaction, which results in poor tilth and excessive runoff. Maintaining a permanent cover of pasture plants slowly increases the organic matter content of this moderately eroded soil. Pasture rotation is needed.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

The land capability classification is IIIe.

353D2—Tell silt loam, 9 to 14 percent slopes, moderately eroded. This strongly sloping, well drained soil is on narrow ridges and convex side slopes in the uplands. Areas are irregular in shape and range mainly from 5 to 30 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is about 38 inches thick. The upper part is yellowish brown, mottled, friable silty clay loam; the next part is brown, mottled, friable sandy clay loam; and the lower part is yellowish brown, very friable loamy sand. The substratum to a depth of about 60 inches is yellowish brown, mottled loamy sand. In some places the depth to sandy material is more than 60 inches. In other places the surface layer contains less organic matter, is thinner, and is lighter in color.

Permeability is moderate in the upper part of this soil and rapid in the lower part. Runoff is rapid. Available water capacity is moderate. The content of organic matter is less than 0.5 percent in the surface layer. The subsoil is slightly acid to strongly acid. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Most areas are used for row crops. This soil is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a severe hazard. It can be controlled by contour farming and a system of conservation tillage that leaves crop residue on the surface. In places farming on the contour and terracing are difficult because of short, irregular slopes. Terracing can expose the coarse textured, droughty substratum. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is moderately suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of hay or pasture plants is effective in controlling erosion. Maintaining a permanent cover of pasture plants slowly increases the organic matter content of this moderately eroded soil and thus improves fertility. Pasture rotation is needed.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

The land capability classification is IVe.

354—Aquolls, ponded. These very poorly drained soils are in depressional areas on bottom land and low benches adjacent to the major streams and rivers. They are subject to ponding by runoff from the adjacent areas and to flooding by the rivers. Areas range from 50 to several hundred acres in size and are irregularly shaped.

Typically, the surface layer is black and very dark gray, friable silty clay loam, loam, or clay loam about 10 inches thick. The subsurface layer is black, very dark gray, or dark gray, friable and firm silty clay loam, clay loam, loam, or sandy loam about 30 inches thick. The substratum to a depth of about 60 inches is very dark gray, dark gray, or gray silty clay loam, clay loam, loam, sandy loam, or loamy sand.

Permeability varies. It generally is moderately slow to very slow. Available water capacity generally is moderate or high. In most areas small ponds have formed or the water table is at or near the surface throughout the year. The content of organic matter in the surface layer ranges from about 5 to 15 percent.

Most areas are idle or are used as wetland wildlife habitat. In many of the areas used as wildlife habitat, the water level is regulated by pumps, which improve the habitat by pumping water from the rivers. These soils generally are suited to wetland wildlife habitat but are unsuited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Draining the soils is very difficult because suitable outlets are not available.

The land capability classification is VIIw.

424E—Lindley-Keswick loams, 14 to 18 percent slopes. These moderately steep soils are on side slopes and convex ridgetops. The well drained Lindley soil is on the lower slopes, and the moderately well drained Keswick soil is on the upper slopes. Areas are irregular in shape and range from 5 to 20 acres in size. They are about 60 percent Lindley soil and 30 percent Keswick soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Lindley soil has a surface layer of very dark grayish brown, friable loam about 4 inches thick. The subsurface layer is dark grayish brown and brown, friable loam about 5 inches thick. The subsoil is about 41 inches thick. The upper part is dark yellowish brown and yellowish brown, mottled, friable loam, and the lower part is yellowish brown and strong brown, mottled, firm clay loam. The substratum to a depth of about 60 inches is strong brown and grayish brown, mottled loam.

Typically, the Keswick soil has a surface layer of very dark gray, friable loam about 4 inches thick. The subsurface layer is dark grayish brown, friable loam about 8 inches thick. The upper part of the subsoil is brown and strong brown, mottled, firm loam and clay loam. The next part is yellowish red, mottled, firm clay. The lower part to a depth of about 60 inches is strong brown, mottled, firm clay loam.

Included with these soils in mapping are some small areas of Ashgrove and Clinton soils. These included soils make up about 10 percent of the unit. The poorly drained Ashgrove soils are in coves at the head of drainageways. They contain more clay and less sand than the Keswick and Lindley soils. Clinton soils are higher on the landscape than the Lindley and Keswick soils. Also, they contain less sand throughout.

The Lindley soil is moderately slowly permeable. The Keswick soil is slowly permeable. Runoff is rapid on both soils. Available water capacity is high in the Lindley soil

and moderate in the Keswick soil. The Keswick soil has a seasonal high water table. The content of organic matter is about 1.0 to 1.5 percent in the surface layer of both soils. The subsoil of the Lindley soil is strongly acid, and that of the Keswick soil is strongly acid or medium acid. The supply of available phosphorus generally is low in the Lindley soil and very low in the Keswick soil. The supply of available potassium is very low in both soils.

Most areas are used for hay and pasture. A few support native hardwoods. Because erosion is a severe hazard, these soils are generally unsuited to corn, soybeans, and small grain. They are moderately suited to grasses and legumes for hay and pasture. Such forage species as tall fescue and orchardgrass are suitable. A cover of hay or pasture plants is very effective in controlling erosion. In most areas reseeding or pasture renovation is needed. Proper stocking rates and pasture rotation help to keep the pasture and the soil in good condition.

These soils are moderately suited to trees. The main management concerns are the windthrow hazard on the Keswick soil and erosion and the equipment limitation on both soils. Carefully selecting sites for logging trails or roads and laying out the trails or roads on the contour help to control erosion. Because of the slope, special logging equipment is needed. Also, caution is needed in operating this equipment. A harvesting system that does not isolate the remaining trees or leave them widely spaced reduces the windthrow hazard.

The land capability classification is VIe.

424E2—Lindley-Keswick loams, 14 to 18 percent slopes, moderately eroded. These strongly sloping soils are on short, convex side slopes and nose slopes in the uplands. The well drained Lindley soil is on the lower slopes, and the moderately well drained Keswick soil is on the upper slopes. Areas are irregular in shape and range from 5 to 20 acres in size. They are about 60 percent Lindley soil and 30 percent Keswick soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Lindley soil has a surface layer of very dark grayish brown, friable loam about 7 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is about 37 inches thick. The upper part is yellowish brown, mottled, friable loam, and the lower part is yellowish brown and strong brown, mottled, firm clay loam. The substratum to a depth of about 60 inches is strong brown and grayish brown clay loam.

Typically, the Keswick soil has a surface layer of brown, friable loam about 7 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The upper part of the subsoil is brown and strong brown, mottled, friable clay loam. The next part is yellowish red, mottled, firm clay. The lower part to a depth of about 60 inches is strong brown, mottled, firm clay loam.

Included with these soils in mapping are small areas of Ashgrove and Clinton soils. These included soils make up about 10 percent of the unit. The poorly drained Ashgrove soils are in coves at the head of drainageways. They contain more clay and less sand than the Lindley and Keswick soils. Clinton soils are on the upper side slopes. They contain less clay than the Lindley and Keswick soils.

The Lindley soil is moderately slowly permeable. The Keswick soil is slowly permeable. Runoff is rapid on both soils. Available water capacity is high in the Lindley soil and moderate in the Keswick soil. The Keswick soil has a seasonal high water table. The content of organic matter is less than 0.5 percent in the surface layer of the Lindley soil and is about 0.5 to 1.0 percent in the surface layer of the Keswick soil. The subsoil of the Lindley soil is strongly acid, and that of the Keswick soil is strongly acid or medium acid. The supply of available phosphorus generally is low in the Lindley soil and very low in the Keswick soil. The supply of available potassium is very low in both soils.

Most areas are used for hay and pasture. All have been cultivated in the past. Because erosion is a severe hazard, these soils are generally unsuited to corn, soybeans, and small grain. They are moderately suited to grasses and legumes for hay and pasture. Such forage species as tall fescue and orchardgrass are suitable. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing causes surface compaction, excessive runoff, and deterioration of tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

These soils are moderately suited to trees. The main management concerns are erosion, the equipment limitation, seedling mortality, and the windthrow hazard. Carefully selecting sites for logging trails or roads and laying out the trails or roads on the contour help to control erosion. Because of the slope, special logging equipment is needed. Also, caution is needed in operating this equipment. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate. A harvesting system that does not isolate the remaining trees or leave them widely spaced reduces the windthrow hazard.

The land capability classification is VIe.

425D2—Keswick loam, 9 to 14 percent slopes, moderately eroded. This strongly sloping, moderately well drained soil is on short, convex side slopes and nose slopes in the uplands. Areas range from 5 to 25 acres in size and are irregularly shaped.

Typically, the surface layer is brown, friable loam about 7 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The upper part of the subsoil is brown and strong brown, mottled, friable loam and clay loam; the next part is yellowish red and brown, mottled, firm clay; and the lower part to a depth of about 60 inches is strong brown, mottled, firm clay loam.

Included with this soil in mapping are areas of the poorly drained Ashgrove soils on the upper slopes. These soils have a subsoil that contains more clay than that of the Keswick soil. They make up about 5 percent of the unit.

Permeability is slow in the Keswick soil, and runoff is rapid. Available water capacity is moderate. This soil has a seasonal high water table. The content of organic matter in the surface layer is about 0.5 to 1.0 percent. The shrink-swell potential is high. The subsoil typically is medium acid or strongly acid in the upper part. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops or for hay and pasture. This soil is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a severe hazard. A system of conservation tillage that leaves crop residue on the surface and contour farming help to prevent excessive soil loss. Tilth generally is fair or poor in the surface layer. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is moderately suited to grasses and legumes for hay and pasture. Most forage species are suitable. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

This soil is moderately suited to trees. The main management concern is the windthrow hazard. A harvesting system that does not isolate the remaining trees or leave them widely spaced reduces this hazard.

The land capability classification is IVe.

428B—Ely silty clay loam, 2 to 5 percent slopes. This gently sloping, somewhat poorly drained soil is at the foot of hillsides and on alluvial fans where waterways empty onto bottom land. Areas are elongated or irregularly shaped and range mainly from 5 to 70 acres in size.

Typically, the surface layer is black, friable silty clay loam about 8 inches thick. The subsurface layer is very dark brown, mottled, friable silty clay loam about 19 inches thick. The subsoil to a depth of about 60 inches is mottled, friable silty clay loam. The upper part is dark grayish brown, and the lower part is grayish brown.

Permeability is moderate, and runoff is medium. Available water capacity is high. This soil has a seasonal high water table. The content of organic matter is about 4 to 6 percent in the surface layer. The subsoil typically is slightly acid. It generally has a low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface, contour farming, and terraces help to prevent excessive soil loss. In places farming on the contour and terracing are difficult because of short, irregular slopes. Interceptor tile helps to remove seepage from the adjacent slopes. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to maintain good tilth.

A cover of pasture plants or hay is effective in controlling erosion. Most forage species grow well on this soil. Overgrazing or grazing when the soil is too wet causes surface compaction and deterioration of tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

The land capability classification is IIe.

430—Ackmore silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on bottom land. It is subject to flooding. Areas are irregularly shaped. They generally range from 10 to 50 acres in size, but some are as large as 100 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The substratum is very dark grayish brown and dark grayish brown, mottled, stratified silt loam about 20 inches thick. Below this to a depth of about 60 inches is a buried layer of black and very dark gray, mottled silty clay loam. In places the soil is silt loam to a depth of 40 inches.

Included with this soil in mapping are some small areas of the poorly drained Colo soils. These soils are generally farther from streams than the Ackmore soil and dry out more slowly after rains. Also, they have a higher organic matter content. They make up less than 10 percent of the unit.

Permeability is moderate in the Ackmore soil, and runoff is slow. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 1 to 3 percent. Reaction typically is medium acid to neutral in the surface layer and substratum. The substratum generally has a low supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. A drainage system reduces the wetness and provides good aeration and a deep root zone for plants. Tile drains work well if they are properly installed and if an adequate outlet is

available. Good tilth generally can be easily maintained. Returning crop residue to the soil or regularly adding other organic material helps to maintain tilth, improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

If this soil is used for pasture, overgrazing reduces forage production. Forage mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy, should be selected for planting.

This soil is well suited to trees. A few areas are wooded. No major hazards or limitations affect planting or harvesting if the proper species are selected for planting and the woodland is managed properly.

The land capability classification is IIw.

453—Tuskeego silt loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is on low alluvial terraces and on bottom land. It is subject to flooding. Areas range from 5 to 30 acres in size and are irregularly shaped.

Typically, the surface layer is very dark gray, friable silt loam about 9 inches thick. The subsurface layer is dark gray, mottled, friable silt loam about 8 inches thick. The subsoil to a depth of about 60 inches is mottled, firm silty clay loam and silty clay. The upper part is dark gray, and the lower part is grayish brown and light brownish gray. In places, the surface soil is darker and the subsoil contains less clay.

Permeability is very slow, and runoff is very slow or ponded. Available water capacity is high. This soil has a seasonal high water table. The content of organic matter in the surface layer is about 2 to 3 percent. The shrink-swell potential is high. The subsoil typically is slightly acid or medium acid in the upper part. It generally has a low supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The flooding is a hazard. Drainage ditches reduce the frequency of flooding in some areas. A subsurface and surface drainage system reduces the wetness, provides aeration and a deep root zone for the plants, and improves the timeliness of fieldwork. In some areas measures that help to control the runoff from nearby soils are needed. Tilth generally is fair or good in the surface layer. Returning crop residue to the soil or regularly adding other organic material and delaying fieldwork when the soil is wet improve fertility and help to prevent deterioration of tilth.

The wetness restricts the types of grasses or legumes that can be grown on this soil. Forage mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy, should be selected for planting. Grazing should be restricted when the soil is wet.

A few areas support native hardwoods. This soil is moderately suited to trees. The main management concerns are the equipment limitation, seedling mortality, and the windthrow hazard. Logging equipment should be used only during the drier periods or during the winter, when the ground is frozen. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate. A harvesting system that does not isolate the remaining trees or leave them widely spaced reduces the windthrow hazard.

The land capability classification is IIIw.

473—Gilford fine sandy loam, 0 to 2 percent slopes. This nearly level, very poorly drained soil is on terraces along the major rivers in the county. It is subject to ponding. Areas are irregular in shape and range mainly from 10 to 60 acres in size.

Typically, the surface layer is black, very friable fine sandy loam about 7 inches thick. The subsurface layer also is black, very friable fine sandy loam. It is about 16 inches thick. The subsoil is about 19 inches thick. The upper part is dark gray and olive gray, mottled, very friable fine sandy loam, and the lower part is mottled gray and dark gray, very friable loamy sand. The substratum to a depth of about 60 inches is multicolored sand.

Permeability is moderately rapid in the upper part of the profile and rapid in the lower part. Runoff is slow. Available water capacity is low or moderate. This soil has a seasonal high water table. The content of organic matter is 3 to 4 percent in the surface layer. The subsoil typically is slightly acid or medium acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If row crops are grown, a drainage system is needed to improve the timeliness of fieldwork. Establishing adequate drainage outlets may be difficult. Also, tile placement may be difficult because of the loose, water-bearing sand. If the soil is plowed in the fall, wind erosion is a hazard. A protective plant cover is needed. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to maintain good tilth.

A cover of hay or pasture plants is effective in controlling wind erosion. The suitable forage species are limited to those mixtures that are tolerant of wet conditions. Examples are birdsfoot trefoil and orchardgrass or red clover and timothy. Restricted grazing and equipment use during wet periods can prevent excessive damage to the plant cover, which increases the susceptibility to wind erosion.

The land capability classification is IIw.

484—Lawson silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on flood plains along rivers and streams. It is subject to flooding. Areas are elongated or irregularly shaped. They generally range from 10 to 50 acres in size, but a few are as large as 100 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam. It is about 27 inches thick. The substratum to a depth of about 60 inches is very dark grayish brown and very dark gray silty clay loam that has thin strata of grayish brown silt loam. In some places the content of sand is higher. In other places the depth to the stratified substratum is more than 36 inches.

Included with this soil in mapping are small areas of the poorly drained Colo soils. These soils make up about 5 to 10 percent of the unit.

Permeability is moderate in the Lawson soil, and runoff is slow. Available water capacity is very high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 3 to 4 percent. The subsurface layer typically is neutral in reaction. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Most areas are cultivated or are used for hay and pasture. Some support trees. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Cultivated crops can be grown in most years. The flooding generally is brief. In many places diversion terraces on adjacent foot slopes help to control the runoff from the higher areas. Good tilth generally can be easily maintained. The soil puddles if worked when wet and crusts after hard rains. Returning crop residue to the soil and delaying fieldwork when the soil is wet help to prevent deterioration of tilth and improve fertility.

If this soil is used for pasture, overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production. Because of the flooding, managing the pasture is difficult. Forage mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy, should be selected for planting. Restricted use following periods of flooding helps to keep the pasture and the soil in good condition. Permanent pasture can be improved by renovating and reseeding.

The land capability classification is IIw.

499G—Nordness silt loam, 18 to 40 percent slopes. This steep and very steep, well drained soil is on short side slopes in the uplands. Areas range from 2 to 20 acres in size and are generally long and narrow.

Typically, the surface layer is dark grayish brown, friable silt loam about 5 inches thick. The subsurface layer is brown, friable silt loam about 4 inches thick. The subsoil is about 8 inches thick. It is brown, friable silt loam and silty clay loam. Fractured limestone bedrock is at a depth of about 17 inches.

Included with this soil in mapping are escarpments of limestone bedrock. These escarpments have slopes ranging from 40 percent to vertical. They make up less than 10 percent of the unit.

Permeability is moderate in the Nordness soil, and runoff is rapid. Available water capacity is low. The content of organic matter in the surface layer is less than 1 percent. The subsoil typically is medium acid to neutral in the upper part. It generally has a very low supply of available phosphorus and potassium.

Most areas are used as woodland and as wildlife habitat. Some small areas are used as permanent pasture. Because of the slope and a severe erosion hazard, this soil is generally unsuitable for cultivated crops. It is extremely limited as a site for other farm uses. Renovating pasture is difficult because of the shallowness to bedrock. Ordinary farm machinery cannot be used because limestone slabs are at or near the surface and slopes generally are too steep. The number of livestock that can graze the pasture without damaging the plant cover is low. As a result, controlled grazing is needed.

Most areas support native hardwoods. This soil is poorly suited to trees. Erosion, the equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate. Carefully selecting sites for logging trails or roads and laying out the trails or roads on the contour help to control erosion. Because of the slope, special logging equipment is needed. Also, caution is needed in operating this equipment. A harvesting system that does not isolate the remaining trees or leave them widely spaced reduces the windthrow hazard.

The land capability classification is VIIs.

520—Coppock silt loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is on low stream terraces along the major and minor streams and rivers. It is subject to flooding, but some areas are protected by levees and by drainage ditches. Areas range from 5 to 40 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is dark grayish brown and grayish brown, mottled, friable silt loam about 19 inches thick. The subsoil to a depth of about 60 inches is grayish brown, mottled, friable silty clay loam. In some places the surface layer is dark grayish brown silt loam and contains less organic matter. In other places it is thicker, is darker, and contains more organic matter.

Included with this soil in mapping are areas of the poorly drained Tuskeego soils in small depressions. These soils cannot be drained so easily as the Coppock soil. Also, they have a more clayey subsoil. They make up about 5 to 10 percent of the unit.

Permeability is moderate in the Coppock soil, and runoff is slow. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 1.5 to 2.5 percent. The subsoil typically is medium acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Many areas are used for cultivated crops. Some are used for pasture. A few support native hardwoods. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The flooding is a hazard. Drainage ditches reduce the frequency of flooding in most areas. If the soil is adequately drained and protected from flooding, row crops can be grown in most years. A subsurface drainage system functions satisfactorily if suitable outlets are available. Diversion terraces on adjacent foot slopes help to control the runoff from the higher areas. Good tilth generally can be easily maintained.

If this soil is used for pasture, overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production. Forage mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy, should be selected for planting.

This soil is well suited to trees. Seedlings survive and grow well. The hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIw.

520B—Coppock silt loam, 2 to 5 percent slopes. This gently sloping, poorly drained soil is on foot slopes along the major and minor streams and rivers. It is subject to flooding, but many areas are protected by drainage ditches. Areas range from 5 to 40 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is dark grayish brown and grayish brown, friable silt loam about 19 inches thick. The subsoil to a depth of about 60 inches is grayish brown, mottled, friable silty clay loam. In some places the surface layer is dark grayish brown silt loam and contains less organic matter. In other places it is thicker, is darker, and contains more organic matter.

Included with this soil in mapping are areas of the poorly drained Tuskeego soils in small depressions on the lower parts of the slopes. These soils cannot be drained so easily as the Coppock soil. Also, they have a more clayey subsoil. They make up about 5 to 10 percent of the unit.

Permeability is moderate in the Coppock soil, and runoff is slow. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 1.5 to 2.5 percent. The subsoil typically is medium acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Many areas are used for cultivated crops. Some are used for pasture. A few support native hardwoods. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Flooding is a hazard. Drainage ditches reduce the frequency of flooding in most areas. If the soil is adequately drained and protected from flooding, row crops can be grown in most years. A subsurface drainage system functions satisfactorily if suitable outlets are available. Diversion terraces on adjacent foot slopes help to control the runoff from the higher areas. Good tilth generally can be easily maintained.

If this soil is used for pasture, overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production. Forage mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy, should be selected for planting.

This soil is well suited to trees. Seedlings survive and grow well. The hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIw.

539—Perks sandy loam, 0 to 3 percent slopes. This very gently sloping, excessively drained soil is on first bottoms. It is subject to flooding. Areas generally are 25 to 150 acres in size and are elongated.

Typically, the surface layer is black, friable sandy loam about 7 inches thick. The subsurface layer is about 20 inches thick. The upper part is very dark brown and very dark grayish brown, friable and very friable sandy loam, and the lower part is dark brown loamy sand. The substratum to a depth of about 60 inches is dark brown, brown, and pale brown loamy sand, sand, and coarse sandy loam. In some areas the surface layer is loamy sand.

Permeability is rapid, and runoff is slow. Available water capacity is very low or low. The content of organic matter in the surface layer is about 0.5 to 1.5 percent. The subsurface layer typically is slightly acid or medium acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Flooding can cause some crop damage, but it is usually brief or very brief. Levees and dikes help to control the floodwater. Droughtiness is a limitation in most years unless rainfall is timely. If cultivated crops are grown, wind erosion is a hazard. A system of conservation

tillage that leaves crop residue on the surface helps to control wind erosion and conserves moisture. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to maintain or improve tilth.

A cover of hay or pasture plants is effective in controlling wind erosion. The suitable forage species are limited to those that are tolerant of dry conditions. Examples are alfalfa, smooth bromegrass, and crownvetch. Managing pasture and hayland is difficult because the soil is droughty during dry periods and is subject to flooding. Forage production may be limited during hot, dry periods because of the very low available water capacity in the substratum. Pasture rotation is needed.

Some areas are wooded. This soil is moderately suited to trees. Seedling mortality is the main management concern. Seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate.

The land capability classification is IIIs.

570B—Nira silty clay loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is in coves at the head of drainageways and on the convex tops and sides of ridges in the uplands. Areas range from 5 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is very dark gray, friable silty clay loam about 7 inches thick. The subsurface layer also is very dark gray, friable silty clay loam. It is about 5 inches thick. The subsoil is mottled, friable silty clay loam about 36 inches thick. The upper part is brown, the next part is grayish brown, and the lower part is olive gray. The substratum to a depth of about 60 inches is light olive gray, mottled silty clay loam. In places the upper part of the subsoil is dark grayish brown.

Included with this soil in mapping are small areas of the somewhat poorly drained Mahaska soils. These soils generally are less sloping than the Nira soil. They make up about 5 to 10 percent of the unit.

Permeability is moderate in the Nira soil, and runoff is medium. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 2.5 to 3.5 percent. The subsoil typically is medium acid. It generally has a low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, erosion is a moderate hazard. A system of conservation tillage that leaves crop residue on the surface, contour farming, and terraces help to prevent excessive soil loss. Tilth generally is fair in the surface layer. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

A cover of pasture plants or hay is effective in controlling erosion. Most forage species are suitable. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

The land capability classification is IIe.

570C2—Nira silty clay loam, 5 to 9 percent slopes, moderately eroded. This moderately sloping, moderately well drained soil is in coves at the head of drainageways and on short, convex side slopes in the uplands. Areas range from 5 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silty clay loam about 8 inches thick. Plowing has mixed streaks and pockets of brown subsoil material with the surface layer. The subsoil is mottled, friable silty clay loam about 28 inches thick. The upper part is brown, the next part is grayish brown, and the lower part is olive gray. The substratum to a depth of about 60 inches is light olive gray, mottled silty clay loam. In places the upper part of the subsoil is dark grayish brown.

Included with this soil in mapping are areas of the poorly drained Rinda soils on the lower slopes. These soils have a subsoil of gray clay. They make up about 5 to 10 percent of the unit.

Permeability is moderate in the Nira soil, and runoff is medium. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 1.5 to 2.5 percent. The subsoil typically is medium acid. It generally has a low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. Some are used for hay and pasture. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a severe hazard. A system of conservation tillage that leaves crop residue on the surface, contour farming, and terraces help to prevent excessive soil loss. Tilth generally is fair in the surface layer. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

The land capability classification is IIIe.

571B—Hedrick silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is in coves at the head of drainageways and on convex side slopes in the uplands. Areas range from 5 to 40 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is brown, friable silt loam about 2 inches thick. The subsoil to a depth of about 60 inches is mottled, friable silty clay loam. The upper part is dark yellowish brown, the next part is light brownish gray, and the lower part is olive gray. In places the surface layer is lighter in color.

Included with this soil in mapping are areas of the somewhat poorly drained Atterberry and Givin soils on the less sloping parts of the landscape. These soils make up about 5 to 10 percent of the unit.

Permeability is moderate in the Hedrick soil, and runoff is medium. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 1.5 to 2.5 percent. The subsoil typically is medium acid or strongly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Many areas are used for cultivated crops or for hay. Some are used for pasture or woodland. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, erosion is a moderate hazard. A system of conservation tillage that leaves crop residue on the surface and contour farming help to prevent excessive soil loss. Good tilth generally can be easily maintained. The surface layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to prevent deterioration of tilth.

A cover of hay or pasture plants is effective in controlling erosion. Most forage species are suitable. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

A few small areas support native hardwoods. This soil is well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIe.

571C2—Hedrick silt loam, 5 to 9 percent slopes, moderately eroded. This moderately sloping, moderately well drained soil is in coves at the head of drainageways and on somewhat short, convex or plane side slopes in the uplands. Areas range from 5 to 40 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. Plowing has mixed streaks and pockets of dark yellowish brown silty clay loam from the subsoil with the surface layer. The subsoil is mottled, friable silty clay loam about 43 inches thick. The upper part is dark yellowish brown, the next part is grayish brown, and the lower part is olive gray. The substratum to a depth of about 60 inches is light olive gray, mottled silty clay loam. In places the surface layer is lighter in color.

Included with this soil in mapping are areas of the poorly drained Rinda soils on the lower parts of the slopes. These soils have a subsoil that contains more clay than that of the Hedrick soil. They make up about 5 to 10 percent of the unit.

Permeability is moderate in the Hedrick soil, and runoff is medium. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 1.0 to 1.5 percent. The subsoil typically is medium acid or strongly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops or for hay and pasture. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a severe hazard. A system of conservation tillage that leaves crop residue on the surface and contour farming help to prevent excessive soil loss. Tilth generally is fair in the surface layer. This layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

A few areas support native hardwoods. This soil is well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIIe.

571D2—Hedrick silt loam, 9 to 14 percent slopes, moderately eroded. This strongly sloping, moderately well drained soil is in coves at the head of drainageways and on somewhat short, convex or plane side slopes in the uplands. Areas range from 5 to 20 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. Plowing has mixed streaks and pockets of brown silty clay loam from the subsoil with the surface layer. The subsoil is mottled, friable silty clay loam about 48 inches thick. The upper part is brown, the next part is light brownish gray, and the lower part is light olive gray. The substratum to a depth of about 60 inches is light olive gray, mottled silty clay loam. In places the surface layer is lighter in color.

Included with this soil in mapping are areas of the poorly drained Rinda soils on the lower slopes. These soils have a subsoil that contains more clay than that of the Hedrick soil. They make up about 5 to 10 percent of the unit.

Permeability is moderate in the Hedrick soil, and runoff is rapid. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter

in the surface layer is about 0.5 to 1.0 percent. The subsoil typically is medium acid or strongly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops or for hay and pasture. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a severe hazard. A system of conservation tillage that leaves crop residue on the surface and contour farming help to prevent excessive soil loss. Tilth generally is fair in the surface layer. This layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

A few areas support native hardwoods. This soil is well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIIe.

572B—Inton silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on short, convex or plane side slopes and in areas around the head of drainageways in the uplands. Areas range from 5 to 30 acres in size and are irregularly shaped.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 3 inches thick. The subsoil is mottled, friable silty clay loam about 43 inches thick. The upper part is yellowish brown, the next part is grayish brown and light brownish gray, and the lower part is light olive gray. The substratum to a depth of about 60 inches is light olive gray and light brownish gray, mottled silty clay loam. In places the surface layer may be mixed with the subsoil.

Included with this soil in mapping are areas of the somewhat poorly drained Keomah soils on the less sloping parts of the landscape. These soils have a subsoil that contains more clay than that of the Inton soil. They make up about 5 to 10 percent of the unit.

Permeability is moderate in the Inton soil, and runoff is medium. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 1 to 2 percent. The subsoil typically is medium acid or strongly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Some areas are used for cultivated crops or pasture. Some support native hardwoods. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, erosion is a hazard. Terraces, contour farming, and a system of conservation tillage that leaves crop residue on the surface help to prevent excessive soil loss. Good tilth generally can be easily maintained. The surface layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to control erosion, helps to prevent surface crusting and deterioration of tilth, and increases the rate of water infiltration.

A cover of pasture plants or hay is effective in controlling erosion. Most forage species are well suited. Overgrazing causes surface compaction, excessive runoff, and deterioration of tilth and thus reduces the extent of the protective plant cover. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

This soil is well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIe.

572C2—Inton silt loam, 5 to 9 percent slopes, moderately eroded. This moderately sloping, moderately well drained soil is on short, convex or nearly plane side slopes and in areas around the head of drainageways in the uplands. Areas range from 5 to 30 acres in size and are irregularly shaped.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. Plowing has mixed streaks and pockets of yellowish brown silty clay loam from the subsoil with the surface layer. The subsoil is about 39 inches thick. It is mottled and friable. The upper part is yellowish brown, grayish brown, and light brownish gray silty clay loam. The lower part is light olive gray silty clay loam and silt loam. The substratum to a depth of about 60 inches is light olive gray and light brownish gray, mottled silt loam. In places the surface layer is silty clay loam.

Included with this soil in mapping are areas of the poorly drained Ashgrove soils on the lower slopes. These soils have a subsoil that contains more clay than that of the Inton soil. They make up about 5 to 10 percent of the unit.

Permeability is moderate in the Inton soil, and runoff is medium. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 0.5 to 1.0 percent. The subsoil typically is medium acid or strongly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Many areas are used as woodland. Some are used for cultivated crops or pasture. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a hazard. Terraces, contour farming, and a system of conservation tillage that leaves crop residue on the surface help to prevent excessive

soil loss. Tilth generally is fair in the surface layer. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

This soil is well suited to grasses and legumes for hay and pasture. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing causes surface compaction, excessive runoff, and deterioration of tilth and thus reduces the extent of the protective plant cover. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

This soil is well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIIe.

572C3—Inton silty clay loam, 5 to 9 percent slopes, severely eroded. This moderately sloping, moderately well drained soil is on short, convex or nearly plane side slopes and in areas around the head of drainageways in the uplands. Areas range from 5 to 30 acres in size and are irregularly shaped.

Typically, the surface layer is mixed yellowish brown and light brownish gray, friable silty clay loam about 7 inches thick. The subsoil is mottled, friable silty clay loam about 28 inches thick. The upper part is light brownish gray and yellowish brown, the next part is light olive gray and light olive brown, and the lower part is light olive gray. The substratum to a depth of about 60 inches is light olive gray and light brownish gray, mottled silt loam.

Included with this soil in mapping are areas of the poorly drained Ashgrove soils on the lower slopes. These soils have a subsoil that contains more clay than that of the Inton soil. They make up about 5 to 10 percent of the unit.

Permeability is moderate in the Inton soil, and runoff is medium. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is less than 0.5 percent. The subsoil typically is medium acid or strongly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops. Some are pastured. This soil is moderately suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a hazard. Terraces, contour farming, and a system of conservation tillage that leaves crop residue on the surface help to prevent excessive soil loss. Tilth generally is poor in the surface layer. This layer is usually cloddy. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing causes surface compaction, excessive runoff, and deterioration of tilth and thus reduces the extent of the protective plant cover. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

This soil is well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIIe.

572D2—Inton silt loam, 9 to 14 percent slopes, moderately eroded. This strongly sloping, moderately well drained soil is on short, convex or nearly plane side slopes and in areas around the head of drainageways in the uplands. Areas range from 5 to 30 acres in size and are irregularly shaped.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. Plowing has mixed streaks and pockets of yellowish brown silty clay loam from the subsoil with the surface layer. The subsoil is mottled, friable silty clay loam about 31 inches thick. The upper part is yellowish brown, the next part is grayish brown and light brownish gray, and the lower part is light olive gray. The substratum to a depth of about 60 inches is light olive gray and light brownish gray, mottled silty clay loam and silt loam. In places the surface layer is silty clay loam.

Included with this soil in mapping are areas of the poorly drained Ashgrove soils on the lower slopes. These soils have a subsoil that contains more clay than that of the Inton soil. They make up about 5 to 10 percent of the unit.

Permeability is moderate in the Inton soil, and runoff is rapid. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 0.5 to 1.0 percent. The subsoil typically is medium acid or strongly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Many areas are used as woodland. Some are used for cultivated crops or pasture. This soil is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a hazard. Terraces, contour farming, and a system of conservation tillage that leaves crop residue on the surface help to prevent excessive soil loss. Tilth generally is fair in the surface layer. The surface layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

This soil is moderately suited to grasses and legumes for hay and pasture. Most forage species are suitable. A cover of pasture plants or hay is effective in controlling

erosion. Overgrazing causes surface compaction, excessive runoff, and deterioration of tilth and thus reduces the extent of the protective plant cover. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

This soil is well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IIIe.

572D3—Inton silty clay loam, 9 to 14 percent slopes, severely eroded. This strongly sloping, moderately well drained soil is on short, convex or nearly plane side slopes and around the head of drainageways in the uplands. Areas range from 5 to 30 acres in size and are irregularly shaped.

Typically, the surface layer is mixed yellowish brown and light olive brown, friable silty clay loam about 8 inches thick. The subsoil is light olive gray and light olive brown, mottled, friable silty clay loam about 28 inches thick. The substratum to a depth of about 60 inches is light olive gray and light olive brown, mottled silty clay loam and silt loam.

Included with this soil in mapping are areas of the poorly drained Ashgrove soils on the lower slopes. These soils contain more clay in the subsoil than the Inton soil. They make up about 5 to 10 percent of the unit.

Permeability is moderate in the Inton soil, and runoff is rapid. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is less than 0.5 percent. The subsoil typically is medium acid or strongly acid. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops. Some are used for pasture. This soil is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a hazard. Terraces, contour farming, and a system of conservation tillage that leaves crop residue on the surface help to prevent excessive soil loss. Tilth generally is poor in the surface layer. This layer is usually cloddy. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth, helps to prevent surface crusting, and increases the rate of water infiltration.

This soil is moderately suited to grasses and legumes for hay and pasture. Most forage species are suitable. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing causes surface compaction, excessive runoff, and deterioration of tilth and thus reduces the extent of the protective plant cover. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture and the soil in good condition.

This soil is well suited to trees. Seedlings survive and grow well, and the hazards or limitations that affect planting or harvesting are slight.

The land capability classification is IVe.

573—Hoopeston loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on alluvial terraces along streams and the major rivers. Areas range from 10 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is very dark brown, friable loam about 9 inches thick. The subsurface layer is very dark grayish brown, friable loam about 8 inches thick. The subsoil is about 24 inches thick. It is mottled and very friable. The upper part is brown fine sandy loam, the next part is yellowish brown sandy loam, and the lower part is dark yellowish brown and yellowish brown loamy sand. The substratum to a depth of about 60 inches is multicolored sand.

Permeability is moderately rapid in the upper part of this soil and rapid in the lower part. Runoff is slow. Available water capacity is moderate. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 2 to 3 percent. The subsoil typically is slightly acid or medium acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Droughtiness is a limitation during periods of below normal rainfall. The water table is moderately high in the spring but drops rapidly during the growing season. A drainage system generally is not needed, but in some areas it improves the timeliness of fieldwork after periods of heavy rainfall. If cultivated crops are grown, wind erosion is a hazard. It can be controlled by a system of conservation tillage that leaves crop residue on the surface. Returning crop residue to the soil conserves moisture.

A cover of pasture plants or hay is effective in controlling wind erosion. Nearly all forage species are suitable. Overgrazing during hot, dry periods reduces the extent of the protective plant cover, which increases the susceptibility to wind erosion.

The land capability classification is IIs.

653—Tuskeego silt loam, sandy substratum, 0 to 2 percent slopes. This nearly level, poorly drained soil is on low alluvial terraces and bottom land. It is subject to flooding. Areas range from 5 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is very dark brown, friable silt loam about 9 inches thick. The subsurface layer is dark gray and gray, mottled, friable silt loam about 14 inches thick. The subsoil is about 29 inches thick. The upper part is dark gray, mottled, firm silty clay; the next part is gray and light olive gray, mottled, firm silty clay loam; and the lower part is grayish brown, very friable

sandy loam. The substratum to a depth of about 60 inches is brown loamy sand. In places the depth to sandy loam, loamy sand, or sand is greater.

Permeability is very slow in the subsoil and rapid in the substratum. Runoff is very slow. Available water capacity is high. This soil has a seasonal high water table. The content of organic matter in the surface layer is about 2 to 3 percent. The shrink-swell potential is high. The subsoil typically is slightly acid or medium acid in the upper part. It generally has a low supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Flooding is a hazard. Drainage ditches reduce the frequency of flooding in many areas. If cultivated crops are grown, a subsurface and surface drainage system reduces the wetness, provides aeration and a deep root zone for the plants, and improves the timeliness of fieldwork. In some areas measures that help to control the runoff from nearby soils are needed. Tilth generally is fair or good in the surface layer. Returning crop residue to the soil or regularly adding other organic material and delaying fieldwork when the soil is wet improve fertility and help to prevent deterioration of tilth.

The wetness restricts the types of grasses and legumes that can be grown on this soil. Forage mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy, should be selected for planting. Grazing should be restricted when the soil is wet.

A few areas support native hardwoods. This soil is moderately suited to trees. The main management concerns are the equipment limitation, seedling mortality, and the windthrow hazard. Logging equipment should be used only during the drier periods or during the winter, when the ground is frozen. Because they do not survive well, seedlings should be planted at closer intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate. A harvesting system that does not isolate the remaining trees or leave them widely spaced reduces the windthrow hazard.

The land capability classification is IIIw.

684—Elrick sandy loam, 0 to 2 percent slopes. This nearly level, well drained soil is on flood plains along rivers. It is protected by levees and dikes but is still subject to flooding. Areas are irregular in shape and range mainly from 50 to more than 200 acres in size.

Typically, the surface layer is very dark grayish brown, very friable sandy loam about 10 inches thick. The subsurface layer is dark brown, very friable sandy loam about 4 inches thick. The subsoil is brown, very friable sandy loam about 20 inches thick. The upper part of the substratum is dark brown sand. The lower part to a depth of about 60 inches is dark yellowish brown sand. In places the surface layer is loamy sand.

Permeability is moderately rapid in the upper part of this soil and very rapid in the lower part. Runoff is slow. Available water capacity is low. The content of organic matter is 1 to 2 percent in the surface layer. The subsoil typically is neutral in reaction. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops, but some are used as pasture or wildlife habitat. This soil is moderately suited to corn, soybeans, small grain and to grasses and legumes for hay and pasture. If irrigated, it is well suited to truck crops, such as tomatoes, potatoes, and melons. Wind erosion is a hazard. Also, the soil is droughty. A system of conservation tillage that leaves crop residue on the surface conserves moisture and helps to control wind erosion. Winter cover crops help to control wind erosion during winter and early spring. Leaving strips of the cover crop in areas where truck crops are planted reduces the hazard of wind erosion during the growing season.

A cover of hay or pasture plants is effective in controlling wind erosion. The soil is suitable for drought-tolerant mixtures, such as alfalfa and smooth bromegrass or crownvetch and tall fescue. Restricted grazing during dry periods helps to prevent damage to the plant cover, which increases the susceptibility to wind erosion.

The land capability classification is IIIs.

688—Koszta silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on stream terraces adjacent to the major streams and rivers. It is subject to flooding. Areas are broad and irregularly shaped and range mainly from 10 to 50 acres in size.

Typically, the surface layer is very dark gray, friable silt loam about 9 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 6 inches thick. The subsoil is mottled, friable silty clay loam about 40 inches thick. The upper part is brown, and the lower part is light brownish gray. The substratum to a depth of about 60 inches is light brownish gray, mottled silty clay loam.

Included with this soil in mapping are some areas of the poorly drained Tuskeego soils. These soils are in plane or depressional areas. They make up about 5 percent of the unit.

Permeability is moderate in the Koszta soil, and runoff is slow. Available water capacity is high. This soil has a seasonal high water table. Tilth generally is good. The content of organic matter is 2 to 3 percent in the surface layer. The subsoil is medium acid or slightly acid. It generally has a high supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The flooding

is a hazard. Drainage ditches reduce the frequency of flooding. Most areas are adequately drained. In some areas, however, tile drains are needed to improve the timeliness of fieldwork in wet years. They function satisfactorily if suitable outlets are available. The surface layer tends to crust after hard rains. It puddles if tilled when wet. Good tilth generally can be easily maintained. Returning crop residue to the soil or regularly adding other organic material improves fertility and helps to maintain tilth.

A cover of hay or pasture plants is effective in controlling wind erosion. Most forage species grow well on this soil. Restricted grazing and equipment use during wet periods can prevent excessive surface compaction, which results in poor tilth. Pasture rotation is needed.

The soil is well suited to trees. No major hazards or limitations affect planting if the proper species are planted and the woodland is managed properly.

The land capability classification is I.

759—Fruitfield sand, 0 to 3 percent slopes. This very gently sloping, excessively drained soil is on flood plains along rivers. It is protected by levees or dikes but is still subject to flooding. Areas are irregular in shape and range mainly from 20 to more than 100 acres in size.

Typically, the surface layer is dark brown, very friable sand about 7 inches thick. The subsurface layer also is dark brown, very friable sand. It is about 13 inches thick. The next layer is brown, loose sand about 18 inches thick. The substratum to a depth of about 60 inches is multicolored coarse sand. In some areas the surface layer is loamy sand. In other areas it is very dark brown.

Permeability is very rapid, and runoff is slow. Available water capacity is low. The content of organic matter is 1.0 to 1.5 percent in the surface layer. The subsurface layer is medium acid to neutral. It generally has a very low supply of available phosphorus and potassium.

Most areas are cultivated. Many are used for truck crops, such as tomatoes, potatoes, and melons. This soil is poorly suited to corn, soybeans, and small grain unless it is irrigated. It is well suited to truck crops if it is irrigated. Wind erosion is a hazard. Also, the soil is very droughty. As the soil dries out, traction of farm machinery can be restricted because the soil is very friable or loose. A system of conservation tillage that leaves crop residue on the surface conserves moisture and helps to control wind erosion. Winter cover crops also help to control wind erosion. Leaving strips of the cover crop in areas where truck crops are planted reduces the hazard of wind erosion during the growing season.

This soil is moderately suited to grasses and legumes for hay and pasture. The suitable forage species are limited to those mixtures that are tolerant of dry conditions, such as alfalfa and smooth bromegrass or crownvetch and tall fescue. A cover of hay or pasture plants is effective in controlling wind erosion. Restricted grazing during dry periods helps to prevent damage to the plant cover, which increases the susceptibility to wind erosion.

The land capability classification is IVs.

779—Kalona silty clay loam, 0 to 1 percent slopes. This level, poorly drained soil is on broad flats in the uplands. Areas range from 50 to 200 acres in size and are irregularly shaped.

Typically, the surface layer is black, firm silty clay loam about 8 inches thick. The subsurface layer also is black, firm silty clay loam. It is about 6 inches thick. The subsoil is about 38 inches thick. It is firm and friable and is mottled. The upper part is very dark gray and olive gray silty clay, and the lower part is olive gray silty clay loam. The substratum to a depth of about 60 inches is olive gray, mottled silty clay loam.

Permeability is moderately slow, and runoff is very slow. Available water capacity is high. This soil has a seasonal high water table. The content of organic matter in the surface layer is about 5 to 6 percent. The shrink-swell potential is high. The subsoil typically is slightly acid or neutral. It generally has a very low supply of available phosphorus and potassium. Tilth generally is poor.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. A subsurface drainage system reduces the wetness and provides aeration and a deep root zone for the plants. Tile drains function satisfactorily, but in some areas suitable outlets are not available. A surface drainage system is needed in some areas. Returning crop residue to the soil and delaying fieldwork when the soil is wet improve tilth.

If this soil is used for pasture, overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production. Forage mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy, should be selected for planting.

The land capability classification is IIw.

793—Bertrand silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on stream terraces along the major streams and rivers. Areas range from 5 to 80 acres in size and are irregularly shaped.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsurface layer is brown and dark yellowish brown, friable silt loam about 4 inches thick. The subsoil is about 41 inches thick. It is friable. The upper part is yellowish brown, mottled silty clay loam; the next part is brown, mottled silty clay loam; and the lower part is yellowish brown loam. The substratum to a depth of about 60 inches is yellowish brown sand. In places it is silt loam or silty clay loam.

Included with this soil in mapping are a few areas of soils that have sand or loamy sand in the subsoil. These soils are droughty in some years of below average rainfall. They are in positions on the landscape similar to those of the Bertrand soil. They make up less than 5 percent of the unit.

The Bertrand soil is moderately permeable in the upper part and rapidly permeable in the substratum. Runoff is slow in cultivated areas. Available water capacity is high. The content of organic matter in the surface layer is about 1 to 2 percent. The subsoil typically is medium acid or strongly acid. It generally has a high supply of available phosphorus and a low supply of available potassium.

Most areas are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Diversion terraces are needed in some areas to divert the runoff from the nearby side slopes. Tilth generally is fair in the surface layer. This layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

If this soil is used for pasture, overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production. Most forage species grow well.

A few areas are wooded. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting if the proper species are selected for planting and the woodland is managed properly.

The land capability classification is I.

793B—Bertrand silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on stream terraces along the major streams and rivers. Areas range from 5 to 30 acres in size and are irregularly shaped.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsurface layer is brown and yellowish brown, friable silt loam about 3 inches thick. The subsoil is about 36 inches thick. It is friable. The upper part is yellowish brown, mottled silty clay loam; the next part is brown, mottled silty clay loam; and the lower part is yellowish brown loam. The substratum to a depth of about 60 inches is yellowish brown sand. In places it is silt loam or silty clay loam.

Included with this soil in mapping are a few areas of soils that have sand or loamy sand in the subsoil. These soils are droughty in some years of below average rainfall. They are in positions on the landscape similar to those of the Bertrand soil. They make up less than 10 percent of the unit.

The Bertrand soil is moderately permeable in the upper part and rapidly permeable in the substratum. Runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 1 to 2 percent. The subsoil is medium acid or strongly acid. It generally has a high supply of available phosphorus and a low supply of available potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. If cultivated crops are grown, erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface helps to prevent excessive soil loss. In some areas terraces can help to control erosion. Tilth generally is fair in the surface layer. This layer tends to crust after hard rains and puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

A cover of pasture plants or hay is effective in controlling erosion. Most forage species are suitable. Overgrazing or grazing when the soil is too wet causes surface compaction and increases the likelihood of puddling. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

A few areas are wooded. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting if the proper species are selected for planting and the woodland is managed properly.

The land capability classification is IIe.

795D2—Ashgrove silty clay loam, 9 to 14 percent slopes, moderately eroded. This strongly sloping, poorly drained soil is on convex or plane side slopes and in coves at the head of upland drainageways. Areas range from 5 to 20 acres in size and are irregularly shaped.

Typically, the surface layer is brown, friable silty clay loam about 8 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil to a depth of about 60 inches is very firm and firm, mottled silty clay. The upper part is dark gray and gray, the next part is olive gray, and the lower part is light olive gray.

Included with this soil in mapping are areas of the well drained Lindley soils on the lower slopes. These soils have a subsoil that contains less clay than that of the Ashgrove soil. They make up about 5 percent of the unit.

Permeability is very slow in the Ashgrove soil, and runoff is rapid. Available water capacity is moderate. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 0.5 to 1.0 percent. The shrink-swell potential is high. The subsoil typically is slightly acid or neutral. It generally has a very low supply of available phosphorus and a low supply of available potassium.

Many areas are used for hay and pasture. Some are wooded. A few are cultivated. This soil is poorly suited to

corn, soybeans, and small grain. If cultivated crops are grown, erosion is a very severe hazard and wetness is a serious limitation. A system of conservation tillage that leaves crop residue on the surface helps to prevent excessive soil loss. Installing interceptor tile in the more permeable soils upslope reduces the wetness in many areas of this soil. Tilth generally is poor or fair in the surface layer. The soil puddles if worked when wet. It crusts after hard rains. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is moderately suited to grasses and legumes for hay and pasture. The best suited forage species are those that can withstand the wetness. Tall fescue and orchardgrass are examples. A cover of pasture plants or hay is effective in controlling erosion. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture and the soil in good condition.

A few areas support native hardwoods. This soil is poorly suited to trees because of the wetness. The main management concerns are the equipment limitation, seedling mortality, and the windthrow hazard. Logging equipment should be used only during the drier periods or during the winter, when the ground is frozen. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate. A harvesting system that does not isolate the remaining trees or leave them widely spaced reduces the windthrow hazard.

The land capability classification is IVe.

826—Rowley silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on low alluvial terraces. It is subject to flooding. Areas range from 5 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is black, friable silt loam about 8 inches thick. The subsurface layer is very dark gray and very dark grayish brown, friable silt loam about 15 inches thick. The subsoil extends to a depth of at least 60 inches. It is friable. The upper part is dark grayish brown, grayish brown, and yellowish brown, mottled silt loam; the next part is grayish brown silt loam; and the lower part is grayish brown and olive gray, mottled silty clay loam.

Included with this soil in mapping are small areas where the slope is more than 2 percent. These areas are subject to erosion. They make up about 5 to 10 percent of the unit.

Permeability is moderate in the Rowley soil, and runoff is slow. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 4 to 6 percent. The subsoil typically is medium acid. It has a low supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Flooding is a hazard. Drainage ditches reduce the frequency of flooding. Tile drains generally are not needed but may be beneficial in some areas. Good tilth generally can be easily maintained. Returning crop residue to the soil or regularly adding other organic material and deferring tillage when the soil is wet help to maintain tilth, improve fertility, help to prevent excessive surface crusting, and increase the rate of water infiltration.

Nearly all forage species grow well on this soil. Overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production.

The land capability classification is IIw.

834—Titus silty clay loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is on flood plains along the major rivers. It is subject to flooding but in many places is protected. Areas range from 40 to 200 acres in size and are irregularly shaped.

Typically, the surface layer is black, friable silty clay loam about 6 inches thick. The subsurface layer also is black, friable silty clay loam. It is about 14 inches thick. The subsoil to a depth of about 60 inches is silty clay loam. The upper part is dark gray, mottled, and firm, and the lower part is olive gray and is firm and friable.

Permeability is slow, and runoff is very slow. Available water capacity is moderate or high. This soil has a seasonal high water table. The content of organic matter in the surface layer is about 3 to 4 percent. The shrink-swell potential is high. The subsoil typically is slightly acid or neutral. It generally has a low supply of available phosphorus and a very low supply of available potassium. Tilth generally is poor.

Most areas are used for cultivated crops. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Subsurface drains reduce the wetness and provide aeration and a deep root zone for the plants. They generally can function if they are closely spaced, but they drain the soil slowly. A surface drainage system is needed. Even though some areas are partially protected, flooding is a hazard. Returning crop residue to the soil and delaying fieldwork when the soil is wet help to prevent excessive surface compaction and improve tilth.

The grasses and legumes selected for planting in areas of pasture or hay should be those mixtures that are tolerant of wet conditions. Examples are birdsfoot trefoil and orchardgrass or red clover and timothy. A drainage system is needed in most areas. Overgrazing or grazing during wet periods causes surface compaction.

The land capability classification is IIIw.

893D2—Gara-Rinda complex, 9 to 14 percent slopes, moderately eroded. These strongly sloping soils are on short, convex side slopes and in coves at the head of drainageways in the uplands. The well drained Gara soil is on the lower slopes, and the poorly drained Rinda soil is on the upper slopes. Areas are irregular in shape and range from 10 to more than 40 acres in size. They are about 70 percent Gara soil and 20 percent Rinda soil. The two soils occur as areas so small or so intricately mixed that mapping them separately is not practical.

Typically, the Gara soil has a surface layer of very dark gray and very dark grayish brown, friable loam about 7 inches thick. Plowing has mixed streaks and pockets of brown subsoil material with the surface layer. The subsoil is mottled clay loam about 40 inches thick. The upper part is brown and yellowish brown and is friable, and the lower part is dark yellowish brown and yellowish brown and is firm. The substratum to a depth of about 60 inches is yellowish brown and dark yellowish brown, mottled clay loam.

Typically, the Rinda soil has a surface layer of very dark grayish brown, friable silty clay loam about 8 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The upper part of the subsoil is grayish brown and brown, mottled, friable silty clay loam. The lower part to a depth of about 60 inches is grayish brown, gray, and dark gray, mottled, firm clay. In places the subsoil is reddish brown clay loam.

Included with these soils in mapping are small areas of Ladoga soils on the upper parts of the slopes. These included soils contain less sand than the Gara and Rinda soils. They make up about 10 percent of the unit.

The Gara soil is moderately slowly permeable. The Rinda soil is very slowly permeable. Runoff is rapid on both soils. Available water capacity is high in the Gara soil and moderate in the Rinda soil. The Rinda soil has a seasonal high water table. The content of organic matter is 0.5 to 1.5 percent in the surface layer of the Gara soil and 1.0 to 1.5 percent in the surface layer of the Rinda soil. The shrink-swell potential is high in the subsoil of the Rinda soil. The subsoil of the Gara soil is typically medium acid or strongly acid in the upper part, and that of the Rinda soil is strongly acid to slightly acid in the upper part. The supply of available phosphorus is low in the Gara soil and very low in the Rinda soil. The supply of available potassium is very low in both soils.

Most areas are used for hay and pasture. Some are used for cultivated crops. Nearly all have been cultivated in the past. These soils are poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a severe hazard. A conservation tillage system that leaves crop residue on the surface and contour farming help to prevent excessive soil loss. Installing interceptor drains in the more permeable soils upslope from the Rinda soil reduces the wetness in many areas.

These soils are moderately suited to grasses and legumes for hay and pasture. Tall fescue and orchardgrass are the best suited forage species. A cover of hay or pasture plants is effective in controlling erosion. Overgrazing or grazing during wet periods causes surface compaction and reduces the extent of the plant cover and thus increases the runoff rate and the susceptibility to erosion. Proper stocking rates and timely deferment of grazing during wet periods help to keep the pasture and the soil in good condition.

A few areas support native hardwoods. The Gara soil is well suited to trees, but the Rinda soil is poorly suited. The hazards or limitations that affect planting or harvesting are slight in areas of the Gara soil. The equipment limitation, seedling mortality, and the windthrow hazard are the main management concerns in areas of the Rinda soil. Logging equipment should be used only during the drier periods or during the winter, when the ground is frozen. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seeding mortality rate. A harvesting system that does not isolate the remaining trees or leave them widely spaced reduces the windthrow hazard.

The land capability classification is IVe.

916B—Downs silt loam, sandy substratum, 2 to 5 percent slopes. This gently sloping, well drained soil is on ridges and convex side slopes in the uplands. Areas range from 20 to 80 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsoil is about 39 inches thick. It is friable. The upper part is brown silty clay loam; the next part is dark yellowish brown and yellowish brown silty clay loam; and the lower part is yellowish brown, mottled silt loam. The substratum to a depth of about 60 inches is yellowish brown fine sand. In some places the sandy material is at a depth of about 3 feet. In other places the surface layer is darker, is thicker, and has a higher content of organic matter.

Permeability is moderate in the silty material and rapid in the sandy material. Runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 2 to 3 percent. The subsoil typically is medium acid. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain. If cultivated crops are grown, erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface, grassed waterways, and stripcropping help to prevent excessive soil loss. Slopes generally are

long enough and uniform enough for terracing and contour farming. Deep cuts for terraces can expose the sandy substratum. Good tilth generally can be easily maintained. The surface layer tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent surface crusting, and increases the rate of water infiltration.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting if the proper species are selected for planting and the woodland is managed properly.

The land capability classification is IIe.

916C2—Downs silt loam, sandy substratum, 5 to 9 percent slopes, moderately eroded. This moderately sloping, well drained soil is on narrow ridges and convex side slopes in the uplands. Areas range from 10 to 80 acres in size and are irregularly shaped.

Typically, the surface layer is mixed very dark grayish brown and brown, friable silt loam about 8 inches thick. Plowing has mixed streaks and pockets of the dark yellowish brown subsoil material with the surface layer. The subsoil is about 36 inches thick. It is friable. The upper part is brown and dark yellowish brown silty clay loam, and the lower part is yellowish brown silt loam. The substratum to a depth of about 60 inches is yellowish brown fine sand. In places the sandy material is at a depth of about 3 feet.

Permeability is moderate in the silty material and rapid in the sandy material. Runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 1 to 2 percent. The subsoil typically is medium acid or strongly acid in the upper part. It generally has a high supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. This soil is suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface, grassed waterways, and stripcropping help to prevent excessive soil loss. Slopes commonly are long enough and uniform enough for terraces and contour farming. Deep cuts for terraces can expose the sandy substratum. Tilth generally is fair in the surface layer. This layer tends to crust after hard rains and puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent surface crusting, and increases the rate of water infiltration.

This soil is suited to grasses and legumes for hay and pasture. Most forage species are suitable. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate and the likelihood of puddling. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting if the proper species are selected for planting and the woodland is managed properly.

The land capability classification is IIIe.

917B—Fayette silt loam, sandy substratum, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex, moderately wide ridgetops. Areas range from 20 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is dark grayish brown, friable silt loam about 6 inches thick. The subsoil is about 52 inches thick. It is friable. The upper part is brown silt loam and silty clay loam, the next part is dark yellowish brown silty clay loam, and the lower part is yellowish brown and strong brown sandy loam and loamy sand. The substratum to a depth of about 63 inches is reddish brown and light olive brown loamy sand. In places loamy sand or sand is at a depth of about 3 feet.

Permeability is moderate in the silty material and rapid in the sandy material. Runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is about 1 to 2 percent. The subsoil typically is medium acid or strongly acid. It generally has a high supply of available phosphorus and a very low supply of available potassium. Tilth is generally fair.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain. If cultivated crops are grown, erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface, grassed waterways, and stripcropping help to prevent excessive soil loss. Slopes commonly are long enough and uniform enough for terraces and contour farming. Deep cuts for terraces can expose the sandy substratum. The soil tends to crust after hard rains. It puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent excessive surface crusting, and increases the rate of water infiltration.

This soil is well suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes

surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting if the proper species are selected for planting and the woodland is managed properly.

The land capability classification is IIe.

917C2—Fayette silt loam, sandy substratum, 5 to 9 percent slopes, moderately eroded. This moderately sloping, well drained soil is on narrow ridges and convex side slopes. Areas range from 20 to more than 50 acres in size and are irregularly shaped.

Typically, the surface layer is dark grayish brown, friable silt loam about 6 inches thick. Plowing has mixed streaks and pockets of subsoil material with the surface layer. The subsoil is about 49 inches thick. It is friable. The upper part is brown silt loam, the next part is yellowish brown silty clay loam, and the lower part is yellowish brown and strong brown sandy loam and loamy sand. The substratum to a depth of about 60 inches is light olive brown and reddish brown loamy fine sand. In places loamy sand or sand is at a depth of about 3 feet.

Permeability is moderate in the silty material and rapid in the sandy material. Runoff is medium or rapid. Available water capacity is high. The content of organic matter in the surface layer is less than 1 percent. The subsoil typically is medium acid or strongly acid. It generally has a high supply of available phosphorus and a very low supply of available potassium. Tilth is generally fair.

Most areas are used for cultivated crops. This soil is suited to corn, soybeans, and small grain. If cultivated crops are grown, further erosion is a hazard. A system of conservation tillage that leaves crop residue on the surface, grassed waterways, and stripcropping help to prevent excessive soil loss. Deep cuts for terraces can expose the sandy material. Slopes generally are too short for terracing and farming on the contour. The surface layer tends to crust after hard rains and puddles if tilled when wet. Returning crop residue to the soil or regularly adding other organic material improves fertility, helps to prevent surface crusting, and increases the rate of water infiltration.

This soil is suited to grasses and legumes for hay and pasture. Most forage species are suitable. A cover of pasture plants or hay is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

This soil is well suited to trees. No major hazards affect planting or harvesting if the proper species are selected for planting and the woodland is managed properly.

The land capability classification is IIIe.

925—Toolesboro loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is on flood plains along rivers. It is protected by levees and dikes but is still subject to flooding. Areas are irregular in shape and range mainly from 50 to more than 200 acres in size.

Typically, the surface layer is very dark grayish brown, friable loam about 9 inches thick. The subsurface layer is dark brown, friable loam about 4 inches thick. The subsoil is about 23 inches thick. It is mottled and very friable. The upper part is dark brown sandy loam, the next part is brown sandy loam, and the lower part is dark yellowish brown loamy sand. The substratum to a depth of about 60 inches is dark yellowish brown loamy sand. In some areas the surface layer is sandy loam.

Included with this soil in mapping are scattered small areas of Ambraw and Shaffton soils. These soils have a surface soil that is thicker than that of the Toolesboro soil and have more clay in the upper part. Also, they have more organic matter and a higher fertility level. They make up about 5 to 10 percent of the unit.

The Toolesboro soil is moderately rapidly permeable in the upper part and very rapidly permeable in the lower part. It has a seasonal high water table. Runoff is slow. Available water capacity is low. The content of organic matter is 2 to 4 percent in the surface layer. The subsoil is medium acid to neutral. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. Some are used for pasture or wildlife habitat. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. It has a high water table during periods of heavy rainfall unless a drainage system is installed. Adequate outlets for subsurface drains commonly are not available. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

The suitable forage species are limited to mixtures that are tolerant of wetness, such as birdsfoot trefoil and orchardgrass or red clover and timothy. Restricted grazing during wet periods helps to prevent excessive compaction and damage to the forage stand.

The land capability classification is IIw.

960—Shaffton loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on flood plains along the major rivers. It is subject to flooding but in many places is protected. Areas range from 20 to 100 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable loam about 11 inches thick. The subsurface layer is dark brown, friable loam about 8 inches thick. The

subsoil is about 31 inches thick. It is mottled. The upper part is brown, friable loam, and the lower part is brown, very friable sandy loam. The substratum to a depth of about 60 inches is stratified sand and loamy sand. It is brown in the upper part and mottled grayish brown and brown in the lower part. In places, the subsoil is grayer and the soil is more poorly drained.

Permeability is moderate in the upper part of the profile and rapid in the substratum. Runoff is slow. Available water capacity is moderate. This soil has a seasonal high water table. The content of organic matter in the surface layer is about 2 to 4 percent. The subsoil typically is medium acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. It is subject to flooding, but most areas are protected by levees and diversion ditches. In most areas the seasonal high water table is lowered by an extensive drainage system. During dry periods the soil may be slightly droughty.

If this soil is used for pasture, overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production. Most forage species grow satisfactorily.

The land capability classification is IIw.

961—Ambraw loam, 0 to 2 percent slopes. This nearly level, poorly drained soil is on flood plains along streams and rivers. It is subject to flooding. Areas range from 10 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is very dark gray, friable loam about 9 inches thick. The subsurface layer is black, friable loam about 10 inches thick. The subsoil is about 26 inches thick. The upper part is dark gray and dark grayish brown, mottled, friable loam; and the lower part is mottled dark gray and grayish brown, friable sandy loam. The substratum to a depth of about 60 inches is grayish brown loamy sand. In places, the subsoil is not so gray and the soil is not so wet.

Permeability is moderate, and runoff is slow. Available water capacity is moderate or high. This soil has a seasonal high water table. The content of organic matter in the surface layer is about 2 to 3 percent. The subsoil typically is medium and or slightly acid. It generally has a medium supply of available phosphorus and a very low supply of available potassium.

Most areas are cultivated. Some are used as woodland or wildlife habitat. A few support native grasses. This soil is only moderately suited to corn, soybeans, and small grain because of flooding during periods of heavy rainfall. In some areas diversion terraces are needed to help control local runoff. In other areas protection against flooding is needed. Subsurface drains reduce wetness and provide aeration and a deep root zone for the plants. Tile drains generally function well if suitable outlets are available. Tilth generally is fair in the surface layer. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

This soil is moderately suited to grasses and legumes for hay and pasture. Overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production. The forage mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy, should be selected for planting.

The land capability classification is IIw.

1058E—Douds-Lindley loams, 14 to 18 percent slopes. These moderately steep, well drained soils are on side slopes in the uplands and on high benches. In most areas, the Douds soil is on the upper part of the slopes and the Lindley soil is on the lower part. In some areas, however, the entire slope is made up of the Douds soil. Areas are elongated and range mainly from 10 to more than 40 acres in size. They are about 55 percent Douds soil and about 35 percent Lindley soil.

Typically, the surface layer of the Douds soil is brown, friable loam about 8 inches thick. The subsoil is about 44 inches thick. The upper part is brown and yellowish brown, friable and firm clay loam, and the lower part is yellowish brown and pale brown, friable and very friable sandy clay loam and sandy loam. The substratum to a depth of about 60 inches is stratified yellowish brown and light yellowish brown sandy loam.

Typically, the surface layer of the Lindley soil is very dark grayish brown, friable loam about 8 inches thick. The subsurface layer is dark grayish brown and brown, friable loam about 3 inches thick. The subsoil is about 39 inches thick. It is mottled. The upper part is yellowish brown, friable loam; the next part is yellowish brown, firm clay loam; and the lower part is strong brown, firm clay loam. The substratum to a depth of about 60 inches is strong brown and grayish brown, mottled clay loam.

Included with these soils in mapping are scattered areas of soils that have a surface soil and subsoil of sandy loam or loamy sand. These included soils are more droughty than the Douds and Lindley soils. Also included are scattered areas of soils that have a subsoil of silty clay or clay. These soils may be seepy during wet periods. Included soils make up about 10 percent of the unit.

Permeability is moderately slow in the Lindley soil and moderate in the Douds soil. Runoff is rapid on both soils. Available water capacity is high in the Lindley soil and moderate in the Douds soil. The content of organic matter is 0.5 to 1.0 percent in the surface layer of the Douds soil and about 1.0 to 1.5 percent in the surface layer of the Lindley soil. The subsoil of both soils typically is strongly acid. The subsoil of the Douds soil generally has a very low supply of available phosphorus and potassium, and that of the Lindley soil generally has

a low supply of available phosphorus and a very low supply of available potassium.

Many areas are used for pasture. Some are used as cropland. Many areas have been cropped in the past. Because of the slope and a severe hazard of erosion, these soils are generally unsuitable for cultivated crops. They are moderately suited to grasses and legumes for hay and pasture. Most forage species grow well. A cover of pasture plants or hay is effective in controlling erosion. Reseeding or pasture renovation is needed in some of the steeper areas, but preparing a seedbed is difficult. Because of the slope, caution is needed in operating farm machinery. Overgrazing or grazing when the soil is too wet causes surface compaction and deterioration of tilth and increases the runoff rate. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition.

A few areas support native hardwoods. These soils are moderately suited to trees. Erosion and the equipment limitation are the main management concerns. Carefully selecting sites for logging trails or roads and laying out the trails or roads on the contour help to control erosion. Because of the slope, special logging equipment is needed. Also, caution is needed in operating this equipment.

The land capability classification is VIe.

1058F—Douds-Lindley loams, 18 to 25 percent slopes. These steep, well drained soils are on side slopes in the uplands and on high benches. In many areas, the Douds soil is on the upper part of the slopes and the Lindley soil is on the lower part. In some areas, however, the entire slope is made of either the Douds soil or the Lindley soil. Areas are elongated and range mainly from 20 to more than 100 acres in size. They are about 55 percent Douds soil and about 35 percent Lindley soil.

Typically, the surface layer of the Douds soil is very dark grayish brown, friable loam about 4 inches thick. The subsurface layer is brown, friable loam about 4 inches thick. The subsoil is about 39 inches thick. The upper part is brown and yellowish brown, friable and firm clay loam, and the lower part is yellowish brown and pale brown, friable and very friable sandy clay loam and sandy loam. The substratum to a depth of about 60 inches is stratified yellowish brown and light yellowish brown sandy loam.

Typically, the surface layer of the Lindley soil is very dark grayish brown, friable loam about 4 inches thick. The subsurface layer is brown, friable loam about 5 inches thick. The subsoil is yellowish brown, mottled, firm clay loam about 38 inches thick. The substratum to a depth of about 60 inches is yellowish brown and strong brown clay loam.

Included with these soils in mapping are scattered areas of soils that have a surface soil and subsoil of sandy loam or loamy sand. These included soils are more droughty than the Douds and Lindley soils. Also included are scattered areas of soils that have a subsoil of silty clay or clay. These soils may be seepy during wet periods. Included soils make up about 10 percent of the unit.

Permeability is moderately slow in the Lindley soil and moderate in the Douds soil. Runoff is rapid on both soils. Available water capacity is high in the Lindley soil and moderate in the Douds soil. The content of organic matter is 0.5 to 1.0 percent in the surface layer of both soils. The subsoil typically is strongly acid. The subsoil of the Douds soil generally has a very low supply of available phosphorus and potassium, and that of the Lindley soil generally has a low supply of available phosphorus and a very low supply of available potassium.

These soils are used primarily for pasture, woodland, or wildlife habitat. Because of a severe hazard of erosion, they are unsuitable for cultivated crops. They are poorly suited to grasses and legumes for pasture. A cover of hay or pasture plants is effective in controlling erosion. Production may be low. Managing pasture or hayland is difficult. Tall fescue, orchardgrass, or other forage species that can withstand cattle traffic should be selected for planting. Overgrazing or grazing when the soil is too wet causes surface compaction, excessive runoff, and deterioration of tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use in wet periods help to keep the pasture and the soil in good condition. Operating ordinary farm machinery is both difficult and hazardous because of the slope.

Many areas support native hardwoods. These soils are moderately suited to trees. Carefully selecting sites for logging trails or roads and laying out the trails or roads on the contour help to control erosion. Because of the slope, special logging equipment is needed. Also, caution is needed in operating this equipment.

The land capability classification is VIIe.

1058G—Douds-Lindley loams, 25 to 40 percent slopes. These very steep, well drained soils are on side slopes in the uplands and on high benches. In many areas, the Douds soil is on the upper part of the slopes and the Lindley soil is on the lower part. In some areas, however, the entire slope is made of either the Douds soil or the Lindley soil. Areas are elongated and range mainly from 30 to more than 200 acres in size. They are about 55 percent Douds soil and about 35 percent Lindley soil.

Typically, the surface layer of the Douds soil is very dark grayish brown, friable loam about 5 inches thick. The subsurface layer is brown, friable loam about 4 inches thick. The subsoil is about 36 inches thick. The upper part is brown and yellowish brown, friable and firm clay loam, and the lower part is yellowish brown and

pale brown, friable and very friable sandy clay loam and sandy loam. The substratum to a depth of about 60 inches is stratified yellowish brown and light yellowish brown sandy loam.

Typically, the surface layer of the Lindley soil is dark brown, friable loam about 5 inches thick. The subsurface layer also is dark brown, friable loam about 5 inches thick. The subsoil is yellowish brown, mottled, firm clay loam about 36 inches thick. The substratum to a depth of about 60 inches is yellowish brown and strong brown, mottled clay loam.

Included with these soils in mapping are scattered areas of soils that have a surface soil and subsoil of sandy loam or loamy sand and that are more droughty than the Douds and Lindley soils and scattered areas of soils that have a subsoil of silty clay or clay and that may be seepy during wet periods. Also included are scattered areas where the slope is more than 40 percent. Some of these areas are nearly vertical. Some are subject to landslides or slumping during wet periods. Included soils make up about 10 percent of the unit.

Permeability is moderately slow in the Lindley soil and moderate in the Douds soil. Runoff is very rapid on both soils. Available water capacity is high in the Lindley soil and moderate in the Douds soil. The content of organic matter is 0.5 to 1.0 percent in the surface layer of the Douds soil and less than 0.5 percent in the surface layer of the Lindley soil. The subsoil of both soils typically is strongly acid. The subsoil of the Douds soil generally has a very low supply of available phosphorus and potassium, and that of the Lindley soil generally has a low supply of available phosphorus and a very low supply of available potassium.

These soils are used primarily for pasture, woodland, or wildlife habitat. Because of a severe hazard of erosion, they are unsuited to cultivated crops. They are poorly suited to grasses and legumes for hay and pasture. A cover of pasture plants is effective in controlling erosion. Production may be low. Managing pasture or hayland is difficult because of the slope. Tall fescue, orchardgrass, or other forage species that can withstand cattle traffic should be selected for planting. Overgrazing or grazing when the soil is too wet causes surface compaction, excessive runoff, and deterioration of tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and the soil in good condition. Operating ordinary farm machinery is both difficult and hazardous because of the slope.

Some areas support native hardwoods. These soils are moderately suited to trees. Carefully selecting sites for logging trails or roads and laying out the trails or roads on the contour help to control erosion. Because of the slope, caution is needed in operating equipment.

The land capability classification is VIIe.

1220—Nodaway silt loam, channeled, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on first bottoms adjacent to meandering streams and old stream channels. It is subject to flooding. Areas range from 20 to 100 acres in size and are long and narrow.

Typically, the surface layer is very dark grayish brown, friable silt loam about 7 inches thick. The substratum to a depth of about 60 inches is dark grayish brown, brown, light brownish gray, and very dark grayish brown, stratified silt loam.

Included with this soil in mapping are areas of the poorly drained Colo soils. These soils are in old stream channels and low lying areas that have not received recent deposits of silty sediment. They make up about 15 percent of the unit.

Permeability is moderate in the Nodaway soil, and runoff is slow. Available water capacity is high or very high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 1 to 2 percent. Reaction typically is neutral throughout the profile. The substratum generally has a medium supply of available phosphorus and a very low supply of available potassium.

Most areas are used for permanent pasture or woodland. A few areas between old channels are cultivated. This soil is poorly suited to corn, soybeans, small grain, and hay. Farming is generally impractical unless the meandering stream channels are filled or straightened. Also, the soil is subject to frequent flooding and deposition. In some areas straightening the channel can reduce the risk of flooding.

This soil is moderately suited to grasses and legumes for pasture. The species selected for planting should be those that can withstand the flooding and deposition. Permanent pasture can be improved by renovating and reseeding.

Many areas support native hardwoods. This soil is well suited to trees. Seedlings survive and grow well. The hazards or limitations that affect planting or harvesting are slight.

The land capability classification is Vw.

1484—Lawson silt loam, channeled, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on flood plains along meandering streams and old stream channels. It is subject to flooding. Areas are elongated or irregularly shaped. They generally range from 10 to 100 acres in size, but a few are about 200 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam. It is about 27 inches thick. The substratum to a depth of about 60 inches is very dark grayish brown and very dark gray silty clay loam that has thin strata of grayish brown silt loam. In some places the content of sand is higher.

In other places the depth to the stratified substratum is more than 36 inches.

Included with this soil in mapping are small areas of the poorly drained Colo soils. These soils make up about 5 to 10 percent of the unit.

Permeability is moderate in the Lawson soil, and runoff is slow. Available water capacity is very high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 3 to 4 percent. The subsurface layer typically is neutral in reaction. It generally has a medium supply of available phosphorus and a low supply of available potassium.

Most areas are wooded and are used as wildlife habitat. Some small areas are used for cultivated crops. This soil is poorly suited to corn, soybeans, small grain, and hay. Farming is generally impractical unless the meandering stream channels are filled or straightened. Also, the soil is subject to frequent flooding and deposition. In some areas straightening the channel can reduce the risk of flooding.

Many areas are pastured. This soil is moderately suited to grasses and legumes for pasture. The species selected for planting should be those that can withstand the flooding and deposition. Permanent pasture can be improved by renovating and reseeding.

The land capability classification is Vw.

1539—Coland-Perks-Lawson complex, frequently flooded, 0 to 2 percent slopes. These nearly level soils are on broad flood plains along large streams and rivers. They are subject to flooding. The Coland soil is poorly drained, the Perks soil is excessively drained, and the Lawson soil is somewhat poorly drained. The landscape commonly is channeled and has low natural levees, sloughs, and small oxbows. Areas range from 10 to more than 300 acres in size. They are about 40 percent Coland soil, 30 percent Perks soil, and 20 percent Lawson soil. The three soils occur as areas so intricately mixed that mapping them separately is not practical.

Typically, the surface layer of the Coland soil is black, friable clay loam about 9 inches thick. The subsurface layer also is black, friable clay loam. It is about 30 inches thick. The next layer is black and dark olive gray, mottled, friable clay loam about 9 inches thick. The substratum to a depth of about 60 inches is dark gray, mottled, stratified sandy loam and sandy clay loam.

Typically, the surface layer of the Perks soil is very dark grayish brown, very friable loamy sand about 9 inches thick. The substratum to a depth of about 60 inches is yellowish brown and light yellowish brown sand. In places the surface layer is sand.

Typically, the surface layer of the Lawson soil is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam. It is about 27 inches thick. The substratum to a depth of about 60 inches is very dark grayish brown and very dark gray silty clay loam that has thin strata of grayish brown silt loam.

Included with these soils in mapping are some areas of somewhat poorly drained soils that are loamy throughout and some areas of poorly drained soils that are silty clay loam throughout. Included soils make up about 10 percent of the unit.

The Coland and Lawson soils are moderately permeable, and the Perks soil is rapidly permeable. Runoff is slow on all three soils. Available water capacity is high in the Coland soil, very low or low in the Perks soil, and very high in the Lawson soil. The Coland and Lawson soils have a seasonal high water table. Tilth generally is fair in all three soils. The content of organic matter is 3.0 to 4.0 percent in the surface layer of the Coland and Lawson soils and 0.5 to 1.5 percent in the surface layer of the Perks soil. The subsurface layer of the Coland soil is slightly acid, the substratum of the Perks soil is slightly acid or medium acid, and the subsurface layer of the Lawson soil is neutral. The Coland soil has a high shrink-swell potential. The supply of available phosphorus generally is medium in the Coland and Lawson soils and very low in the Perks soil. The supply of available potassium generally is very low in the Coland and Perks soils and low in the Lawson soil.

Most areas support native timber (fig. 8). Some small areas have been cleared and leveled and are used for row crops. These soils are generally unsuited to corn, soybeans, small grain, and hay because of the many old channels, sloughs, and oxbows.

These soils are moderately suited to grasses for pasture. Forage production may be low on the sandy Perks soil. A cover of pasture plants is effective in controlling wind erosion. In most areas the suitable forage species are limited to those that are tolerant of wet conditions, such as orchardgrass and timothy. Managing the pasture is difficult. Restricted grazing during wet periods helps to prevent surface compaction, poor tilth, and damage to the plant cover. Pasture rotation is needed.

These soils are well suited to trees. Because of the flooding, harvesting should be very timely. Equipment should be used only during the drier periods or during the winter, when the ground is frozen. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate.

The land capability classification is Vw.

1730B—Nodaway-Klum complex, channeled, 0 to 5 percent slopes. These gently sloping, moderately well drained soils are along small streams. They are subject to flooding. Areas are elongated and range mainly from 10 to 100 acres in size. They are about 55 percent Nodaway soil and 35 percent Klum soil. The two soils

Figure 8.—A wooded area of Coland-Perks-Lawson complex, frequently flooded, 0 to 2 percent slopes.

occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the surface layer of the Nodaway soil is very dark grayish brown, friable silt loam about 7 inches thick. The substratum to a depth of about 60 inches is dark grayish brown, brown, light brownish gray, and very dark grayish brown, stratified silt loam.

Typically, the surface layer of the Klum soil is dark brown, friable fine sandy loam about 8 inches thick. The substratum is about 39 inches of multicolored, stratified sandy loam, sand, and silt loam. Below this to a depth of about 60 inches is very dark gray silty clay loam.

Included with these soils in mapping are the poorly drained Colo soils in low areas, Coppock soils on foot slopes, and scattered areas of the excessively drained Perks soils. Colo soils have a surface soil that is darker and thicker than that of the Nodaway and Klum soils. Coppock soils are not stratified and have a light colored subsurface layer. Perks soils contain more sand than the

Nodaway and Klum soils. Included soils make up about 10 percent of the unit.

The Nodaway soil is moderately permeable, and the Klum soil is moderately rapidly permeable. Runoff generally is slow on both soils. Both have a seasonal high water table. Available water capacity is high or very high in the Nodaway soil and low or moderate in the Klum soil. The content of organic matter is 1.0 to 2.0 percent in the surface layer of the Nodaway soil and 1.0 to 1.5 percent in the surface layer of the Klum soil. The substratum of both soils typically is neutral in reaction. The substratum of the Klum soil generally has a very low supply of available phosphorus and potassium. The substratum of the Nodaway soil has a medium supply of available phosphorus and a very low supply of available potassium.

Most areas are used for pasture (fig. 9), timber, or wildlife habitat. Because of the meandering stream channels, these soils are generally unsuited to corn, soybeans, and small grain. They are poorly suited to grasses and legumes for hay and pasture. Some small areas can be cropped, but the flooding and the wetness are problems. Because of the flooding, managing pasture may be difficult. Because of the meandering channels, haying is difficult. Permanent pasture can be improved by reseeding and renovating. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods and following periods of flooding help to keep the pasture in good condition.

Many areas support native hardwoods. These soils are well suited to trees. Seedlings survive and grow well. No major hazards or limitations affect planting or harvesting.

The land capability classification is Vw.

3133—Colo silty clay loam, rarely flooded, 0 to 2 percent slopes. This nearly level, poorly drained soil is on flood plains along the major rivers. It is protected by levees along the Mississippi and Iowa Rivers and by a drainage system that includes pumps. It can be flooded only under extreme conditions, when the levees are breached. Areas range from 40 to 200 acres in size and are irregularly shaped.

Typically, the surface layer is black, friable silty clay loam about 8 inches thick. The subsurface layer is black and very dark gray, mottled, friable silty clay loam about 41 inches thick. The subsoil to a depth of about 60 inches is gray, friable silty clay loam. In places the surface layer is silt loam.

Included with this soil in mapping are areas of Zook soils in small depressions or in meandering old channels. These soils make up about 5 to 10 percent of the unit. They are slowly permeable. Their subsurface layer is thicker and darker than that of the Colo soil and contains more clay. Also, their surface layer contains more organic matter.

Permeability is moderate in the Colo soil, and runoff is very slow. Available water capacity is high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 4 to 6 percent. The subsoil typically is slightly acid. It generally has a medium supply of available phosphorus and a very low supply of available potassium.

Nearly all areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain. A subsurface drainage system is needed to reduce the wetness and provide aeration and a deep root zone for plants. It generally functions satisfactorily, but a surface drainage system is needed in some areas. Even though most areas are protected, flooding is a hazard. Tilth generally is fair or good in the surface layer. Returning crop residue to the soil and delaying fieldwork when the soil is wet help to prevent deterioration of tilth.

A cover of pasture plants or hay is effective in controlling erosion. The suitable forage species are limited to those mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy. Grazing when the soil is wet causes surface compaction and deterioration of tilth.

The land capability classification is IIw.

3133+—Colo loamy sand, overwash, 0 to 2 percent slopes. This nearly level, poorly drained soil is on flood plains along the major rivers. It is protected by levees along the Mississippi and Iowa Rivers and by a drainage system that includes pumps. It can be flooded only under extreme conditions, when the levees are breached. Areas range from 10 to 100 acres in size and are irregularly shaped.

Typically, the surface layer is light brownish gray, very friable loamy sand about 8 inches thick. The substratum also is light brownish gray, very friable loamy sand. It is about 7 inches thick. The next layer is black, mottled, friable silty clay loam about 41 inches thick. Below this to a depth of about 60 inches is gray silty clay loam.

Permeability is moderate, and runoff is very slow. Available water capacity is high. This soil has a seasonal high water table. The content of organic matter in the surface layer is less than 1 percent. The subsoil typically is slightly acid. It generally has a very low supply of available phosphorus and potassium.

Nearly all areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain. A subsurface drainage system is needed to reduce the wetness and provide aeration and a deep root zone for the plants. It generally functions satisfactorily. If cultivated crops are grown, wind erosion is a hazard. Unless the surface is protected by vegetation or crop residue, windblown sand grains can damage newly emerged crops. The loose or very friable consistence of the surface layer can cause difficulty in operating farm machinery and in controlling the planting depth. Even though most areas are protected, flooding is a hazard. Tilth generally is fair or good in the surface layer.

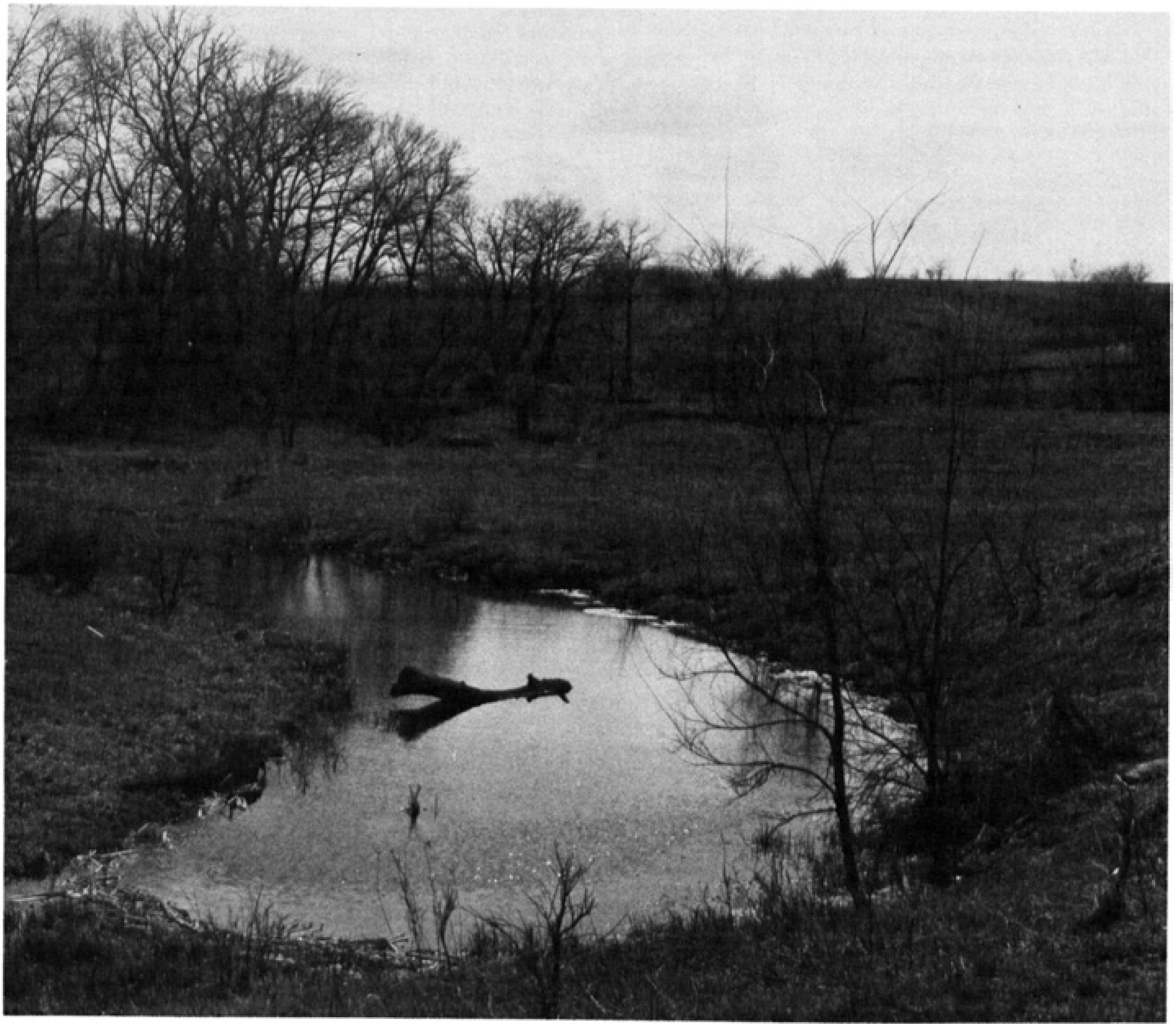

Figure 9.—A pastured area of Nodaway-Klum complex, channeled, 0 to 5 percent slopes.

A cover of pasture plants or hay is effective in controlling wind erosion. The suitable forage species are limited to those mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy. Restricted grazing and equipment use during dry periods can prevent excessive damage to the plant cover.

The land capability classification is IIw.

3539—Perks sandy loam, rarely flooded, 0 to 3 percent slopes. This very gently sloping, excessively drained soil is on flood plains along the major streams and rivers in the county. It is protected by levees but can be flooded if the levees are breached. Areas are irregular in shape and range mainly from 10 to 120 acres in size.

Typically, the surface layer is black, friable sandy loam about 7 inches thick. The subsurface layer is about 20

inches thick. The upper part is very dark brown and very dark grayish brown, friable and very friable sandy loam. The lower part is dark brown loamy sand. The substratum to a depth of about 60 inches is dark brown, brown, and pale brown loamy sand, sand, and coarse sandy loam.

Included with this soil in mapping are some areas of the somewhat poorly drained Shaffton soils in low spots. These soils have less sand in the substratum than the Perks soil. They make up about 10 percent of the unit.

The Perks soil is rapidly permeable. Runoff is slow. Available water capacity is very low or low. The content of organic matter is 0.5 to 1.5 percent in the surface layer. The substratum is slightly acid or medium acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are used for cultivated crops. Some are wooded. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. It is droughty unless rainfall is above normal and timely. If cultivated crops are grown, wind erosion is a severe hazard. A system of conservation tillage that leaves crop residue on the surface helps to control wind erosion and conserves moisture. Returning crop residue to the surface or regularly adding other organic material improves fertility.

A cover of hay or pasture plants is effective in controlling wind erosion. The suitable forage species are limited to those that are tolerant of dry conditions. Examples are alfalfa, smooth bromegrass, and crownvetch. Managing pasture and hayland is difficult because the soil is droughty during dry periods. Forage production may be limited during hot, dry periods because of the very low available water capacity in the substratum. Pasture rotation is needed.

This soil is moderately suited to trees. Seedling mortality is the main management concern. Because they do not survive well, seedlings should be planted at close intervals. Thinning the stand helps to provide adequate growing space for the surviving trees. Planting the larger or older nursery stock and mulching reduce the seedling mortality rate.

The land capability classification is IIIs.

3834—Titus silty clay loam, rarely flooded, 0 to 2 percent slopes. This nearly level, poorly drained soil is on flood plains along the major rivers. It is protected by levees along the Mississippi and Iowa Rivers and by a drainage system that includes pumps. It can be flooded only under extreme conditions, when the levees are breached. Areas range from 40 to 200 acres in size and are irregularly shaped.

Typically, the surface layer is black, friable silty clay loam about 6 inches thick. The subsurface layer also is black, friable silty clay loam. It is about 14 inches thick. The subsoil to a depth of about 60 inches is silty clay loam. The upper part is dark gray, mottled, and firm, and the lower part is olive gray and is firm and friable.

Permeability is slow, and runoff is very slow. Available water capacity is moderate or high. The soil has a seasonal high water table. The content of organic matter in the surface layer is about 3 to 4 percent. The shrink-swell potential is high. The subsoil typically is slightly acid or neutral. It generally has a low supply of available phosphorus and a very low supply of available potassium. Tilth generally is poor.

Most areas are used for cultivated crops. This soil is moderately suited to corn, soybeans, and small grain. Subsurface drains reduce the wetness and provide aeration and a deep root zone for the plants. They generally can function if they are closely spaced, but they drain the soil slowly. A surface drainage system is needed (fig. 10). Even though most areas are protected, flooding is a hazard. Returning crop residue to the soil and delaying fieldwork when the soil is wet help to prevent excessive surface compaction and improve tilth.

This soil is moderately suited to grasses and legumes for hay and pasture. Forage mixtures that are tolerant of wet conditions, such as birdsfoot trefoil and orchardgrass or red clover and timothy, should be selected for planting. A drainage system is needed in most areas. Overgrazing or grazing during wet periods causes surface compaction.

The land capability classification is IIIw.

3960—Shaffton loam, rarely flooded, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on flood plains along the major rivers. It is protected by levees along the Mississippi and Iowa Rivers and by a drainage system that includes pumps. It can be flooded only under extreme conditions, when the levees are breached. Areas range from 20 to 100 acres in size and are irregularly shaped.

Typically, the surface layer is very dark grayish brown, friable loam about 11 inches thick. The subsurface layer is dark brown, friable loam about 8 inches thick. The subsoil is about 31 inches thick. It is brown and mottled. The upper part is friable loam, and the lower part is very friable sandy loam. The substratum to a depth of about 60 inches is stratified brown and grayish brown, mottled sand and loamy sand. In places the surface layer contains more sand. In other places, the subsoil is grayer and the soil is more poorly drained.

Permeability is moderate in the upper part of the profile and rapid in the substratum. Runoff is slow. Available water capacity is moderate. This soil has a seasonal high water table. The content of organic matter in the surface layer is about 2 to 4 percent. The subsoil typically is slightly acid or medium acid. It generally has a very low supply of available phosphorus and potassium.

Most areas are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Even though most areas

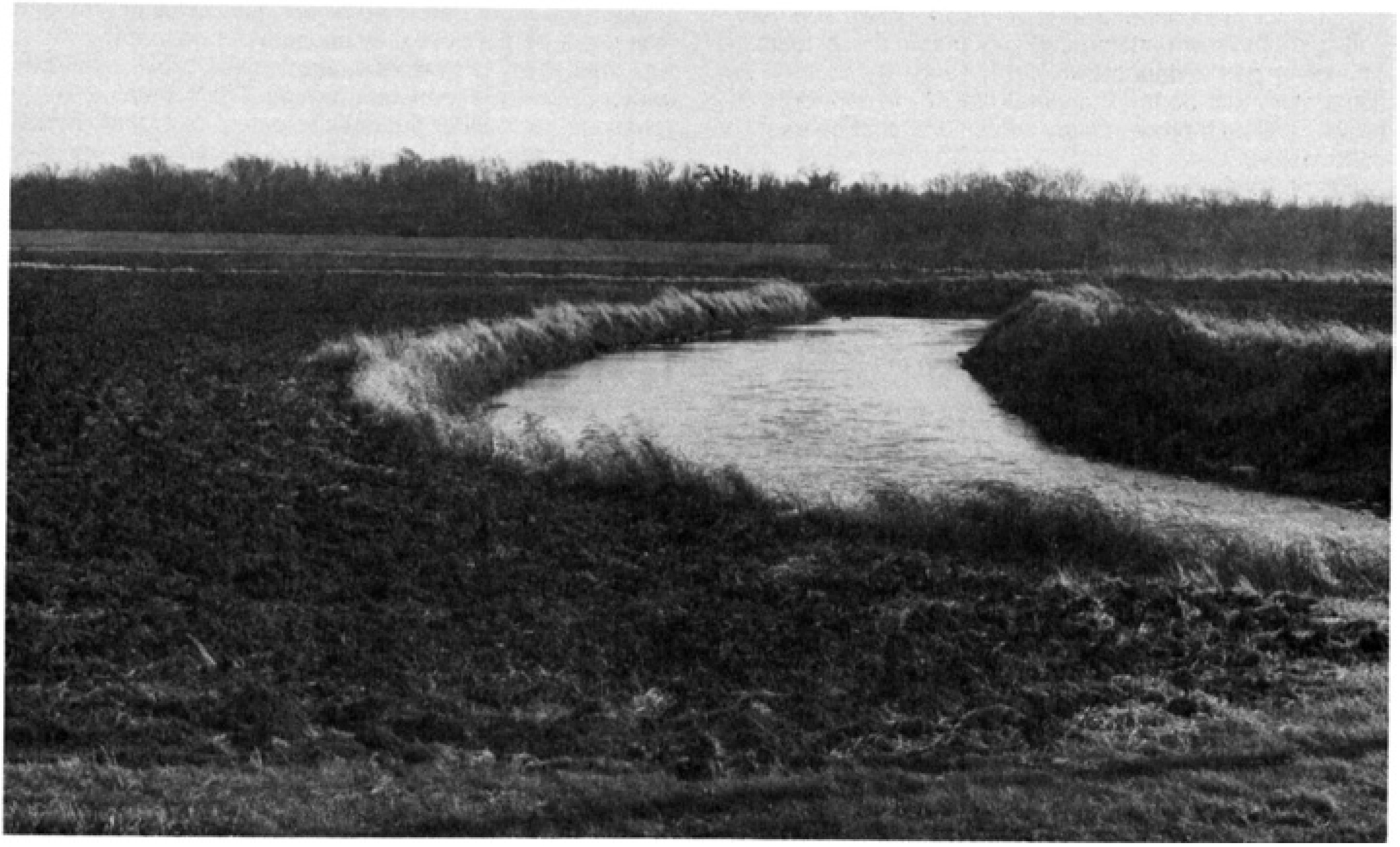

Figure 10.—A drainage ditch in an area of Titus silty clay loam, rarely flooded, 0 to 2 percent slopes.

are protected, flooding is a hazard. In most areas the seasonal high water table is lowered by an extensive drainage system. The soil may be slightly droughty during dry periods.

If this soil is used for pasture, overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production. Most forage species grow well.

The land capability classification is IIw.

3961—Ambraw loam, rarely flooded, 0 to 2 percent slopes. This nearly level, poorly drained soil is on flood plains along streams and rivers. It is protected by levees along the Mississippi and Iowa Rivers and by a drainage system that includes pumps. It can be flooded only under extreme conditions, when the levees are breached. Areas range from 20 to 100 acres in size and are irregularly shaped.

Typically, the surface layer is very dark gray, friable loam about 9 inches thick. The subsurface layer is black, friable loam about 10 inches thick. The subsoil is about 26 inches thick. It is mottled and friable. The upper part is dark gray and dark grayish brown loam, and the lower part is dark gray and grayish brown sandy loam. The substratum to a depth of about 60 inches is grayish brown loamy sand. In places, the subsoil is not so gray and the soil is not so wet.

Permeability is moderate, and runoff is slow. Available water capacity is moderate or high. This soil has a seasonal high water table. The content of organic matter in the surface layer is about 2 to 3 percent. The subsoil typically is medium acid or slightly acid. It generally has a medium supply of available phosphorus and a very low supply of available potassium.

Most areas are used for cultivated crops. Some are used as woodland or wildlife habitat. A few support native grasses. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Subsurface drains are needed to reduce the wetness and provide aeration and a deep root zone for the plants. Tile drains generally function well. Even though most areas are protected, flooding is a hazard. Tilth generally is fair in the surface layer. Returning crop residue to the soil or regularly adding other organic material improves fertility and tilth.

If this soil is used for pasture, overgrazing or grazing during wet periods causes surface compaction and poor tilth and reduces forage production. The only suitable forage species are those mixtures that are tolerant of wet conditions. Examples are birdsfoot trefoil and orchardgrass or red clover and timothy.

The land capability classification is IIw.

5010—Pits, sand and gravel. This map unit is dominantly on stream benches. Some of the pits are no longer mined. Areas range from less than 1 acre to more than 40 acres in size and commonly are square or rectangular.

Typically, available water capacity is low or very low in the soil material. As a result, the material tends to be droughty during much of the growing season. In most areas it has a seasonal high water table. Also, the low lying areas are ponded during wet periods. The content of organic matter in the surface layer is less than 1 percent. Reaction typically is moderately alkaline.

Most of the inactive pits support weeds and small trees. Some have been used as refuse dumps. The pits can be developed for wildlife or recreational uses. The trees and shrubs that can withstand a high content of lime and the droughtiness should be selected for planting.

No land capability classification is assigned.

5030—Pits, limestone quarry. This map unit consists of pits from which limestone has been quarried, primarily for use as road-construction material and as agricultural lime. The pits are 40 or more feet deep and are surrounded by piles of spoil 15 or more feet high. They range from a few acres to 40 acres in size and are irregularly shaped. Some contain water a few to many feet deep and have steep sides.

The spoil surrounding the pits varies in texture but generally is loamy. It contains varying amounts of limestone fragments. It is derived from glacial till, eolian material, or a mixture of the two. In some areas it has been leveled and smoothed, but in other areas it is very uneven. In the leveled areas grasses or trees grow reasonably well. The spoil ranges from medium acid to mildly alkaline.

The quarries are well suited to wildlife habitat. Those containing water can support fish. Because of the steepness of the sides and the variable depth of the water, however, they could be dangerous as sites for recreation and wildlife habitat. Onsite investigation is needed to determine the hazard.

No land capability classification is assigned.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban and built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 151,250 acres in Louisa County, or nearly 57 percent of the total acreage, meets the soil requirements for prime farmland. Nearly all of this prime farmland is used for crops. The crops grown on this land, mainly corn and soybeans, account for an estimated 60 percent of the county's total agricultural income each year.

A recent trend in land use in some parts of the county has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify for prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 159,000 acres in Louisa County was used for row crops and small grain in 1978. Of this total, about 99,000 acres was used for corn; 50,000 acres for soybeans; 3,000 acres for close-grown crops, mainly oats and wheat; and 7,000 acres for hay. About 500 acres was used for melons, sweet corn, and other vegetables. This acreage is concentrated in an area called Muscatine Island.

Food production could be increased by extending the latest crop production technology to all of the cropland in the county. This soil survey can greatly facilitate the application of such technology. The paragraphs that follow describe the main management concerns in the areas used for crops and pasture.

Water erosion is the major problem on about half of the cropland and pasture in Louisa County. If the slope is more than 3 percent, erosion is a hazard.

Loss of the surface layer through erosion is damaging for many reasons. Productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into a plow layer. Loss of the surface layer is especially damaging to soils that are shallow over bedrock, such as Nordness soils. Erosion also reduces the productivity of soils that tend to be droughty, such as Dickinson, Chelsea, and Sparta soils. Sediment is deposited in streams as erosion occurs. Control of erosion helps to maintain the productivity of the soils and improves the quality of water for municipal use, for recreation, and for fish and wildlife by minimizing the pollution of streams and ponds.

A protective plant cover helps to control erosion, reduces the runoff rate, and increases the rate of water infiltration. A cropping system that keeps a plant cover on the surface for extended periods can hold soil losses to an amount that will not reduce the productive capacity of the soils. On livestock farms, where part of the acreage is pasture and hayland, including legumes and grasses in the cropping system not only provides nitrogen and improves tilth for the following crop but also reduces the risk of erosion on the more sloping soils.

A system of conservation tillage that leaves crop residue on the surface is effective in controlling erosion. It is effective only if enough crop residue is left on the surface after planting. The impact of raindrops on the surface is the major cause of sheet erosion. Various kinds of conservation tillage can control this erosion. The type of conservation tillage system to be applied in a particular field depends on the kind of soil. Soils that have a high content of clay in the surface layer, such as Kalona, Zook, and Taintor soils, are best suited to such conservation tillage systems as strip-till planting. This form of tillage minimizes the yield-robbing effects of compaction and of cool, wet planting conditions in the spring. Clinton and Fayette soils, which generally are in the rougher areas of the county, and sandy soils on bottom land are best suited to no-till planting or mulch tillage (fig. 11).

Contour farming and stripcropping help to control erosion on many soils in the county. They are most effective in areas where slopes are smooth and uniform, including most areas of Downs, Fayette, and Tama soils.

Terraces and diversions reduce the length of slopes and thus the runoff rate and the risk of erosion. They are most practical on deep, well drained soils that have long, uniform slopes. Many areas of Downs, Fayette, Tama, Ladoga, and Mahaska soils are well suited to terracing. Other soils are less well suited to terraces and diversions because slopes are irregular or are too steep or because bedrock is within a depth of 40 inches. Terracing is not practical on Chelsea, Sparta, and other soils that have short, irregular slopes and are coarse textured or moderately coarse textured. On these soils a cropping system that provides a substantial plant cover and a system of conservation tillage that leaves crop residue on the surface are effective in controlling erosion.

In some areas of Ladoga, Clinton, and Lindley soils, slopes are so short, steep, and irregular that contour

Figure 11.—No-till farming in an area of Clinton soils.

farming and terracing are not practical. On these soils a cropping system that provides a protective plant cover, a conservation tillage system that leaves crop residue on the surface, and sediment- and water-control basins are needed to control erosion.

Wind erosion is a hazard on some soils, especially on the sandier soils, such as Chelsea and Sparta (fig. 12). It can damage such soils in a few hours if winds are strong and the soils are dry and have no plant cover or surface mulch. Maintaining a plant cover or surface mulch and keeping the surface rough through proper tillage minimize the damage caused by wind erosion.

A cover of pasture plants is effective in controlling erosion. Most of the pastures in the county support a permanent cover of bluegrass. Some have been renovated. Such plants as birdsfoot trefoil have been introduced in the renovated areas. Grasses, such as bromegrass, or grass-legume mixtures, such as alfalfa and bromegrass, are planted on Clinton, Fayette, Ladoga, Lindley, and other well drained and moderately well drained soils. Excessively drained to somewhat poorly drained soils, such as Muscatine, Ladoga, Tama, Dickinson, and Sparta soils, are well suited to warm-season grasses, such as switchgrass, big bluestem, and indiangrass. Pastured areas of poorly drained soils, such as Garwin, Kalona, Colo, Taintor, and Titus soils, dominantly support timothy, reed canarygrass, and switchgrass.

Forage production can be increased by good management. The management needed on established stands includes applications of fertilizer, control of weeds and brush, rotation and deferred grazing in a full-season grazing system, proper stocking rates, and adequate livestock watering facilities. Erosion is a severe hazard if the protective plant cover is destroyed when the more sloping areas of pasture and hayland are renovated. If cultivated crops are grown prior to seeding, soil loss can be reduced by a system of conservation tillage that leaves crop residue on the surface, contour farming, and grassed waterways. Interseeding grasses and legumes into the existing sod eliminates the need for destroying the plant cover during seedbed preparation.

Drainage is a major management concern in Louisa County. Poorly drained and somewhat poorly drained soils make up about 45 percent of the county. A subsurface drainage system is used to reduce the wetness of soils on bottom land, such as Ambraw, Colo, and Titus soils, and of soils on uplands, such as Taintor and Walford soils. In areas of somewhat poorly drained soils, such as Mahaska, Givin, and Shaffton soils, a drainage system improves the timeliness of fieldwork.

In some areas of poorly drained soils, such as Titus, Tuskeego, and Zook soils, a tile drainage system alone is not sufficient because of slow or very slow permeability. In these areas a surface drainage system is needed, either alone or in conjunction with a tile drainage system. Some type of drainage system has been installed in nearly all areas of poorly drained or very poorly drained soils, but in some areas it is not adequate.

Figure 12.—A protective cover of hay in an area of Sparta sand, 0 to 2 percent slopes. Wind erosion is a hazard on this soil.

Soil fertility is affected by the supply of available phosphorus and potassium in the subsoil, by reaction, and by the content of organic matter. The supply of available phosphorus and potassium is low or very low in most of the soils in the county. Clinton and Fayette are the major soils that have a high supply of available phosphorus, and Colo, Downs, Givin, Hedrick, Inton, Ladoga, and Mahaska are the major soils that have a medium supply.

Most of the upland soils have an acid subsoil. Applications of ground limestone are needed to raise the pH level sufficiently for alfalfa and other crops to grow well. The poorly drained Kalona soils generally are neutral.

In most medium textured and moderately fine textured, well drained upland soils that formed under forest vegetation, the content of organic matter is about 1 to 2 percent in the surface layer. In eroded soils, however, it generally is less than 1 percent. In medium textured and moderately fine textured soils that formed under grasses and trees, such as Downs soils, the content is about 2 to 3 percent. It is about 3 to 4 percent in medium textured and moderately fine textured soils that formed under grasses, such as Mahaska and Tama soils. It is 5 to 6 percent in poorly drained upland soils, such as Kalona soils.

The soils that formed in alluvium on bottom land are dominantly neutral or slightly acid. Their subsoil generally has a low or very low supply of available phosphorus and potassium. The content of organic matter ranges from 0.5 to 6.0 percent.

Applications of lime and fertilizer should be based on the results of soil tests, on the needs of the crop, and on the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts needed.

Soil tilth is an important factor affecting the germination of seeds and the infiltration of water into the soil. Soils with good tilth generally are high in content of organic matter and are granular and porous.

Most of the soils used for crops in the county have a surface layer of silt loam or silty clay loam. Some soils, such as Clinton and Fayette, are low in content of organic matter. Following periods of intense rainfall, a crust forms on the surface of these soils. Because it is hard when dry, the crust hinders water infiltration. It also increases the runoff rate. Regularly adding crop residue, manure, and other organic material improves soil structure and helps to prevent surface crusting.

Fall plowing is not suitable on light colored soils because a crust forms during the following winter and spring. If they are plowed in the fall, many of these soils are nearly as dense and hard at the time of planting as they were before they were plowed. Most of the more sloping soils are subject to wind erosion if they are fall plowed. Also, fall plowing increases the susceptibility to water erosion during periods of snowmelt and spring runoff.

Field crops suited to the soils and climate of the county include many that are not commonly grown. Corn and soybeans are the most commonly grown crops. Grain sorghum, sunflowers, potatoes, sugar beets, sweet corn, popcorn, pumpkins, canning peas, canning beans, and navy beans can be grown if economic conditions are favorable. Oats is the most common close-growing crop. Rye, barley, buckwheat, wheat, and flax could be grown, and grass seed could be produced from bromegrass, redtop, bluegrass, switchgrass, big bluestem, and indiangrass.

Specialty crops that are grown commercially in the county are limited in extent. Most of the well drained soils are suitable for orchards and nursery plants. Soils in low lying areas where frost is frequent and air drainage is poor, however, generally are poorly suited to early vegetables, small fruits, and orchards. The latest information about growing specialty crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the

Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops (*14*). Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, a high content of rock fragments in the soil. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions

considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment or season of use is not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *productivity class*. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *productivity class*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced on a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, reduce energy requirements, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding

and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, orchardgrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these

plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and elderberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the

performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, the available water capacity in the upper 40 inches, and the content of calcium carbonate affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined

by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, and bedrock.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment (fig. 13). Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

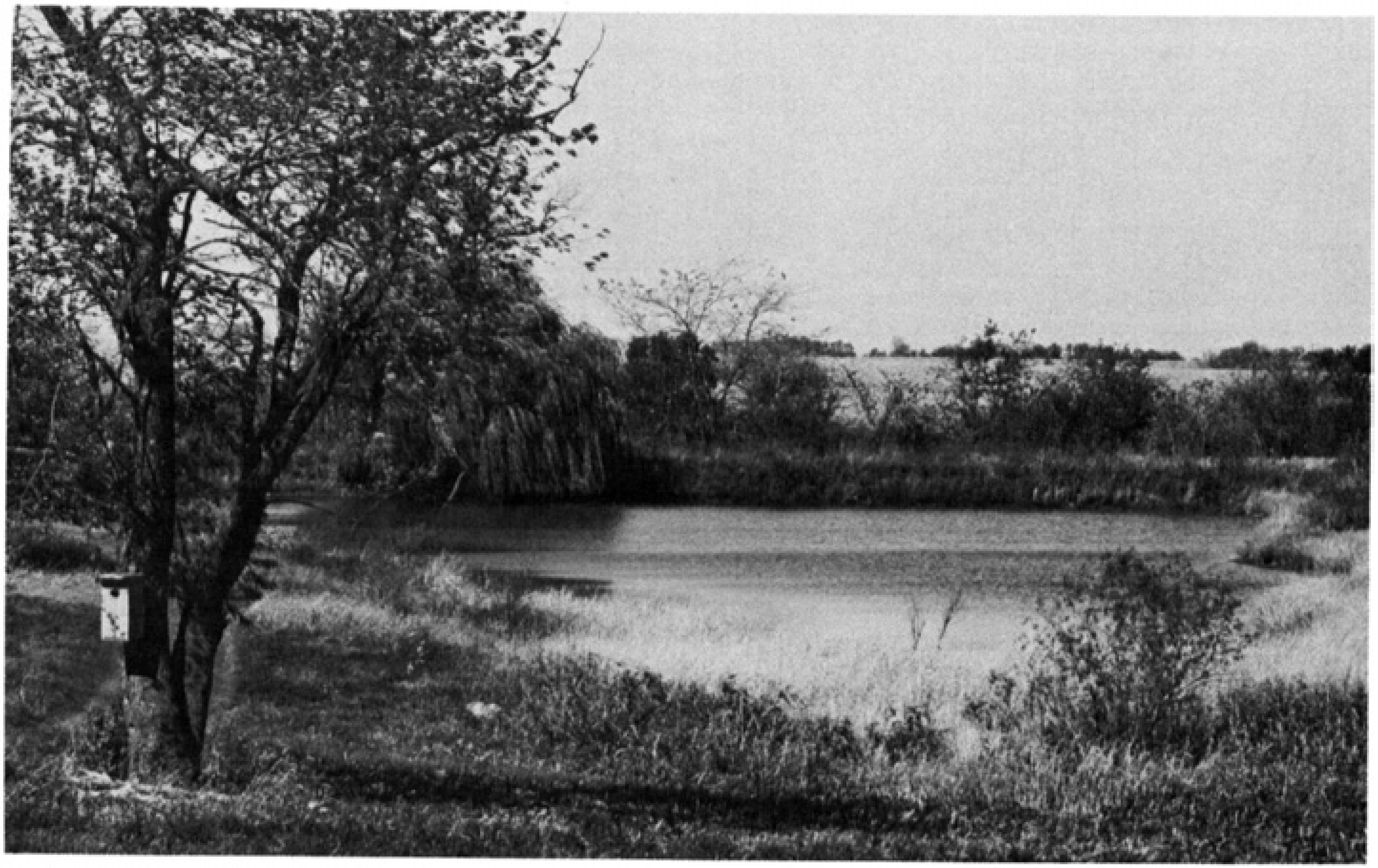

Figure 13.—A farm pond in an area of Clinton soils. Farm ponds help to control gullying on these soils. They also provide opportunities for recreation and habitat for wildlife.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders or of organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

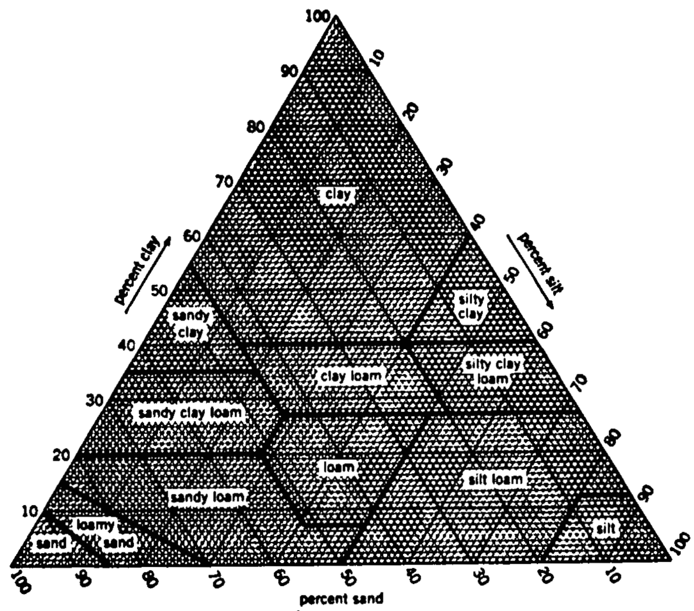

Figure 14.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture (*13*). These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 14). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of

grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to

buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 20 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 20 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 17, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams and by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*16*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquoll (*Aqu*, meaning water, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquolls (*Hapl*, meaning minimal horizonation, plus *aquoll*, the suborder of the Mollisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, mesic Typic Haplaquolls.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*13*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*16*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Ackmore Series

The Ackmore series consists of somewhat poorly drained, moderately permeable soils on flood plains and alluvial fans. These soils formed in recently deposited silty alluvium. The native vegetation was prairie grasses. Slopes range from 0 to 2 percent.

Typical pedon of Ackmore silt loam, 0 to 2 percent slopes, in a pasture; 1,425 feet west and 125 feet south of the northeast corner of sec. 13, T. 73 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; weak fine granular structure; friable; few fine roots; medium acid; abrupt smooth boundary.

C—9 to 29 inches; stratified very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) silt loam; common fine faint grayish brown (10YR 5/2), common fine distinct black (10YR 2/1) and dark brown (7.5YR 3/2), and few fine distinct strong brown (7.5YR 5/6) mottles; weak thin platy structure; friable; few fine roots; few fine pores; medium acid; clear smooth boundary.

2Ab1—29 to 34 inches; black (10YR 2/1) silty clay loam; weak fine granular structure; friable; neutral; clear smooth boundary.

2Ab2—34 to 43 inches; black (10YR 2/1) silty clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; moderate fine subangular blocky structure; firm; neutral; clear smooth boundary.

2Ab3—43 to 52 inches; very dark gray (10YR 3/1) silty clay loam; common fine faint dark grayish brown (10YR 4/2) and few fine distinct dark brown (7.5YR 3/2) mottles; weak fine subangular blocky structure; friable; slightly acid; clear smooth boundary.

2Ab4—52 to 60 inches; very dark gray (10YR 3/1) silty clay loam; common fine distinct dark brown (7.5YR 3/2) and common fine faint dark grayish brown (10YR 4/2) mottles; weak fine subangular blocky structure; friable; neutral.

The depth to the 2Ab horizon ranges from 20 to 36 inches. The surface layer is 5 to 10 inches thick. Reaction is medium acid to neutral in the A and C horizons and neutral or slightly acid in the 2Ab horizon.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The content of clay in this horizon ranges from 20 to 30 percent. The C horizon has value of 3 to 5 and chroma of 1 or 2. It is silt loam or silty clay loam. The 2Ab horizon has value of 2 or 3 and chroma of 0 or 1. The content of clay in this horizon ranges from 26 to 35 percent.

Ambraw Series

The Ambraw series consists of poorly drained, moderately permeable soils on flood plains. These soils formed in loamy alluvium. The native vegetation was prairie grasses. Slopes range from 0 to 2 percent.

Typical pedon of Ambraw loam, 0 to 2 percent slopes, in an area of cropland; 980 feet east and 630 feet south of the center of sec. 9, T. 76 N., R. 5 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) loam (21 percent clay), dark grayish brown (10YR 4/2) dry; moderate very fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

A—9 to 19 inches; black (10YR 2/1) loam (21 percent clay), dark gray (10YR 4/1) dry; weak very fine granular structure; friable; common fine roots; slightly acid; gradual wavy boundary.

Bg1—19 to 23 inches; dark gray (10YR 4/1) loam (25 percent clay); very dark gray (10YR 3/1) coatings on faces of peds; few fine distinct brown (7.5YR 4/4) mottles; weak fine subangular blocky structure; friable; common fine roots; slightly acid; gradual wavy boundary.

Bg2—23 to 36 inches; mottled dark gray (10YR 4/1) and dark grayish brown (10YR 4/2) loam (25 percent clay); few fine distinct brown (7.5YR 4/2) mottles; weak fine and medium subangular blocky structure; friable; medium acid; gradual wavy boundary.

Bg3—36 to 45 inches; mottled dark gray (10YR 4/1) and grayish brown (10YR 5/2) sandy loam (17 percent clay); few fine distinct brown (7.5YR 4/4) mottles; weak medium prismatic structure parting to weak fine subangular blocky; friable; few fine dark concretions (manganese oxide); slightly acid; gradual wavy boundary.

C—45 to 60 inches; grayish brown (10YR 5/2) loamy sand (8 percent clay); massive; very friable; some thin strata of sandy loam and sand; slightly acid.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 12 to 24 inches.

The A horizon has value of 2 or 3 and chroma 1 or 2. The B horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 or 2. It is loam, sandy clay loam, or sandy loam. It is medium acid to neutral. The C horizon is stratified loam to sand.

Ashgrove Series

The Ashgrove series consists of poorly drained, very slowly permeable soils on short, convex side slopes and in coves at the upper end of drainageways in the uplands. These soils formed in a thin mantle of loess and in the underlying clayey and loamy glacial till. The native vegetation was deciduous trees. Slopes range from 9 to 14 percent.

These soils are taxadjuncts to the Ashgrove series because they have a lower chroma in the upper part of the Bt horizon than is definitive for the series.

Typical pedon of Ashgrove silty clay loam, 9 to 14 percent slopes, moderately eroded, in an area of cropland; 900 feet west and 1,000 feet north of the southeast corner of sec. 3, T. 75 N., R. 5 W.

Ap—0 to 8 inches; brown (10YR 5/3) silty clay loam, pale brown (10YR 6/3) dry; mixed with streaks and pockets of dark gray (10YR 4/1) silty clay subsoil material; moderate fine subangular and angular blocky structure; friable; few fine silt coatings, light gray (10YR 7/2) dry; common fine roots; slightly acid; abrupt smooth boundary.

2Btg1—8 to 17 inches; dark gray (10YR 4/1) silty clay; weak medium and fine subangular blocky structure;

very firm; thin discontinuous clay films; few fine roots; slightly acid; gradual smooth boundary.

2Btg2—17 to 28 inches; gray (10YR 5/1) silty clay; weak medium and fine subangular blocky structure; very firm; few thin discontinuous dark gray (10YR 4/1) clay films; few fine roots; slightly acid; gradual smooth boundary.

2Btg3—28 to 41 inches; gray (10YR 5/1) silty clay; common medium distinct light olive brown (2.5Y 5/4) and common fine and medium distinct strong brown (7.5YR 4/6) mottles; weak fine and medium subangular blocky structure; very firm; thin discontinuous clay films; discontinuous silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine roots; neutral; clear smooth boundary.

2Btg4—41 to 48 inches; olive gray (5Y 5/2) silty clay; common fine faint olive (5Y 5/4 and 5/3) mottles; moderate medium subangular blocky structure; firm; thin discontinuous clay films; discontinuous silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine quartz grains; neutral; clear smooth boundary.

2Btg5—48 to 56 inches; olive gray (5Y 5/2) silty clay; common fine faint olive (5Y 4/6) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine angular blocky structure; firm; thin discontinuous clay films; discontinuous silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine quartz grains; neutral; clear smooth boundary.

2Bg—56 to 60 inches; light olive gray (5Y 6/2) silty clay; common medium distinct yellowish brown (10YR 5/6) and common fine and medium prominent strong brown (7.5YR 4/6) mottles; weak medium subangular blocky structure; friable; few fine quartz grains; neutral.

The thickness of the solum ranges from 42 to more than 60 inches. The surface layer is 5 to 9 inches thick.

The Ap horizon has value of 4 or 5 and chroma of 3 or 4. It generally is silty clay loam, but the range includes silt loam. The A horizon, if it occurs, is less than 6 inches thick. It has value of 3 or 4 and chroma of 1 or 2. The E horizon, if it occurs, has value of 4 or 5 and chroma of 2 or 3. The A and E horizons generally are silty clay loam, but the range includes silt loam. The content of clay in these horizons is 22 to 30 percent. The A, E, and 2Btg horizons range from very strongly acid to neutral. The 2Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 to 3. The content of clay in this horizon ranges from 40 to 60 percent.

Atterberry Series

The Atterberry series consists of somewhat poorly drained, moderately permeable soils on the tops of ridges in the uplands. These soils formed in loess. The native vegetation was mixed prairie grasses and deciduous trees. Slopes range from 0 to 2 percent.

Typical pedon of Atterberry silt loam, 0 to 2 percent slopes, in an area of cropland; 1,290 feet south and 295 feet west of the center of sec. 35, T. 75 N., R. 3 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam (21 percent clay), grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

E—9 to 13 inches; dark grayish brown (10YR 4/2) silt loam (25 percent clay), light brownish gray (10YR 6/2) dry; mixed with some very dark gray (10YR 3/1) material in the lower part; weak medium platy structure parting to weak very fine subangular blocky; friable; few fine roots; medium acid; clear smooth boundary.

Bt1—13 to 19 inches; dark yellowish brown (10YR 4/4) silty clay loam (29 percent clay); common dark grayish brown (10YR 4/2) coatings on faces of peds; common fine distinct dark grayish brown (10YR 4/2) mottles; moderate fine subangular blocky structure; friable; thin discontinuous clay films; many distinct silt coatings, light gray (10YR 7/2) dry; few fine roots; medium acid; clear smooth boundary.

Bt2—19 to 24 inches; yellowish brown (10YR 5/4) silty clay loam (34 percent clay); few dark grayish brown (10YR 4/2) coatings on faces of peds; common fine distinct light olive brown (2.5Y 5/4), common fine faint yellowish brown (10YR 5/6), and few fine distinct strong brown (7.5YR 5/6) mottles; moderate fine angular blocky structure; friable; thin discontinuous clay films; common distinct silt coatings, light gray (10YR 7/2) dry; few fine roots; few fine dark concretions (manganese oxide); medium acid; clear smooth boundary.

Bt3—24 to 30 inches; yellowish brown (10YR 5/4) silty clay loam (35 percent clay); few dark grayish brown (2.5Y 4/2) and grayish brown (2.5Y 5/2) coatings on faces of peds; common fine faint light olive brown (2.5Y 5/4) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium angular blocky structure; friable; thin nearly continuous clay films; common distinct silt coatings, light gray (10YR 7/2) dry; few fine roots; common fine dark concretions (manganese oxide); medium acid; clear smooth boundary.

Bt4—30 to 36 inches; light brownish gray (2.5Y 6/2) silty clay loam (35 percent clay); few grayish brown (2.5Y 5/2) coatings on faces of peds; common medium distinct yellowish brown (10YR 5/6), common fine faint light yellowish brown (2.5Y 6/4), and few fine distinct strong brown (7.5YR 4/6) and dark yellowish brown (10YR 4/4) mottles; moderate fine prismatic structure parting to moderate medium angular blocky; friable; thin discontinuous clay films; few fine roots; few fine dark concretions (manganese oxide); medium acid; clear smooth boundary.

Bt5—36 to 44 inches; light brownish gray (2.5Y 6/2) silty clay loam (33 percent clay); few grayish brown (2.5Y 5/2) coatings on faces of peds; common fine distinct yellowish brown (10YR 5/6 and 5/8) and few fine distinct strong brown (7.5YR 4/6) mottles; weak fine prismatic structure parting to weak medium subangular blocky; friable; few fine roots; thin discontinuous clay films; common fine dark concretions (manganese oxide); very dark grayish brown (10YR 3/2) fillings in old root channels; medium acid; clear smooth boundary.

BC—44 to 51 inches; light brownish gray (2.5Y 6/2) silty clay loam (30 percent clay); common fine distinct yellowish brown (10YR 5/6 and 5/8) and strong brown (7.5YR 4/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few fine dark concretions (manganese oxide); medium acid; gradual smooth boundary.

C—51 to 60 inches; mottled light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/6 and 5/8) silt loam (26 percent clay); few fine distinct strong brown (7.5YR 4/6) mottles; massive; friable; few fine dark concretions (manganese oxide); medium acid.

The thickness of the solum ranges from 50 to more than 60 inches. The Ap or A horizon is 6 to 9 inches thick. It has value of 2 or 3 and chroma of 1 or 2. Its clay content is 20 to 26 percent. The A horizon is medium acid to neutral. The E horizon has value of 4 to 6 and chroma of 1 to 3. The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 6, and chroma of 2 to 4. It is strongly acid to slightly acid. The content of clay in this horizon is 27 to 35 percent.

Bertrand Series

The Bertrand series consists of well drained soils on stream terraces. These soils formed in stratified, silty alluvial sediments. The native vegetation was deciduous trees. Permeability is moderate in the solum and rapid in the substratum. Slopes range from 0 to 5 percent.

Typical pedon of Bertrand silt loam, 0 to 2 percent slopes, in an area of cropland; 1,980 feet west and 270 feet north of the southeast corner of sec. 27, T. 76 N., R. 5 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam (21 percent clay), light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

E—9 to 13 inches; brown (10YR 4/3) and dark yellowish brown (10YR 4/4) silt loam (21 percent clay), very pale brown (10YR 7/3) dry; weak thin platy structure parting to weak fine subangular blocky; friable; few fine roots; medium acid; clear wavy boundary.

BE—13 to 20 inches; yellowish brown (10YR 5/4) silty clay loam (29 percent clay); few fine distinct dark yellowish brown (10YR 4/4) mottles; weak fine subangular and angular blocky structure; friable; nearly continuous silt coatings, light gray (10YR 7/2) dry; few fine roots; few fine dark concretions (manganese oxide); medium acid; clear wavy boundary.

Bt1—20 to 26 inches; yellowish brown (10YR 5/4) silty clay loam (33 percent clay); few fine faint brown (10YR 5/3) mottles; moderate fine and medium angular blocky structure; friable; common silt coatings, light gray (10YR 7/2) dry; few fine roots; medium acid; gradual wavy boundary.

Bt2—26 to 38 inches; yellowish brown (10YR 5/4) silty clay loam (33 percent clay); few fine faint brown (10YR 5/3) mottles; moderate medium angular and subangular blocky structure; friable; thin nearly continuous clay films; patchy silt coatings, light gray (10YR 7/2) dry; few fine roots; few fine dark concretions (manganese oxide); strongly acid; gradual wavy boundary.

Bt3—38 to 46 inches; brown (10YR 4/3) silty clay loam (33 percent clay); few fine faint yellowish brown (10YR 5/4), common fine faint dark yellowish brown (10YR 4/4), and common fine and medium faint grayish brown (10YR 5/2) mottles; moderate medium prismatic structure parting to moderate medium subangular and angular blocky; friable; thin nearly continuous clay films; patchy silt coatings, light gray (10YR 7/2) dry; few fine roots; common fine dark concretions (manganese oxide); strongly acid; clear wavy boundary.

2BC—46 to 54 inches; yellowish brown (10YR 5/4) loam (21 percent clay); moderate medium prismatic structure parting to weak medium subangular and angular blocky; friable; patchy sand and silt coatings, light gray (10YR 7/2) dry; few fine roots; strongly acid; clear wavy boundary.

2C—54 to 60 inches; yellowish brown (10YR 5/4) sand (5 percent clay); single grained; loose; medium acid.

The thickness of the solum ranges from 48 to more than 60 inches. The surface layer is 4 to 9 inches thick. The depth to sand ranges from 40 to 55 inches.

The A or Ap horizon has value of 3 or 4 and chroma of 2 or 3. It is medium acid to neutral. The E horizon has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has value of 4 or 5 and chroma of 3 or 4. It is very strongly acid to medium acid. The content of clay in this horizon ranges from 28 to 37 percent.

Bolan Series

The Bolan series consists of well drained soils on stream terraces. These soils formed in loamy and sandy alluvial sediments. The native vegetation was prairie grasses. Permeability is moderate in the solum and rapid in the substratum. Slopes range from 0 to 5 percent.

Typical pedon of Bolan loam, 0 to 2 percent slopes, in an area of cropland; 2,450 feet east and 50 feet south of the northwest corner of sec. 13, T. 73 N., R. 3 W.

Ap—0 to 9 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; few fine roots; neutral; clear smooth boundary.

A1—9 to 12 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; very dark brown (10YR 2/2) coatings on faces of peds; weak fine granular structure; friable; common fine roots; slightly acid; gradual wavy boundary.

A2—12 to 16 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate very fine subangular blocky structure; friable; common fine roots; slightly acid; clear wavy boundary.

BA—16 to 20 inches; brown (10YR 4/3) loam; dark brown (10YR 3/3) coatings on faces of a few peds; moderate fine and very fine subangular blocky structure; friable; few fine roots; slightly acid; clear wavy boundary.

Bw—20 to 30 inches; dark yellowish brown (10YR 4/4) loam; brown (10YR 4/3) coatings on faces of a few peds; moderate fine and very fine subangular blocky structure; friable; few fine roots; medium acid; gradual wavy boundary.

BC—30 to 40 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine and medium subangular blocky structure; very friable; few fine roots; medium acid; gradual wavy boundary.

2C1—40 to 52 inches; dark yellowish brown (10YR 4/6) loamy fine sand; single grained; loose; medium acid; clear wavy boundary.

2C2—52 to 60 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; medium acid.

The thickness of the solum ranges 30 to 50 inches. The thickness of the mollic epipedon ranges from 12 to 24 inches.

The A horizon has value and chroma of 2 or 3. It is dominantly loam, but the range includes silt loam that has a high content of very fine sand or fine sand. The Bw horizon has value of 3 to 5 and chroma of 3 to 6. It is neutral to medium acid. The 2C horizon has value and chroma of 3 to 6.

Chelsea Series

The Chelsea series consists of excessively drained, rapidly permeable soils on convex ridgetops and side slopes in the uplands and on low stream terraces. These soils formed in wind-deposited sandy material or in sandy alluvium reworked by the wind. The native vegetation was deciduous trees. Slopes range from 1 to 18 percent.

Typical pedon of Chelsea loamy fine sand, 1 to 5 percent slopes, in an area of cropland; 1,900 feet south and 138 feet east of the center of sec. 8, T. 75 N., R. 4 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loamy fine sand, brown (10YR 5/3) dry; weak fine granular structure; very friable; few fine roots; slightly acid; clear smooth boundary.

E1—6 to 11 inches; brown (10YR 4/3) loamy fine sand, brown (10YR 5/3) dry; weak fine granular structure; very friable; few fine roots; slightly acid; clear smooth boundary.

E2—11 to 20 inches; brown (10YR 4/3) sand, brown (10YR 5/3) dry; weak medium angular blocky structure; very friable; strongly acid; clear smooth boundary.

E&Bt—20 to 60 inches; dark yellowish brown (10YR 4/4) sand; single grained; loose; several bands of brown (10YR 4/3) and dark brown (7.5YR 3/4) sandy loam, 0.5 inch to 3.0 inches thick, at depths of 29, 38, 46, and 53 inches; strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The surface layer is 5 to 9 inches thick. The E horizon is 12 to 24 inches thick.

The A or Ap horizon has value of 3 or 4 and chroma of 1 to 3. It is neutral to medium acid. The E horizon has value of 4 to 6 and chroma of 3 to 6. It is slightly acid to strongly acid. The E&Bt horizon has value and chroma of 3 or 4.

Clinton Series

The Clinton series consists of moderately well drained, moderately slowly permeable soils on convex ridgetops and the upper side slopes in the uplands. These soils formed in loess. The native vegetation was deciduous trees. Slopes range from 2 to 14 percent.

Typical pedon of Clinton silt loam, 2 to 5 percent slopes, in an area of cropland; 920 feet north and 180 feet west of the southeast corner of sec. 32, T. 73 N., R. 3 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam (22 percent clay), light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common very fine roots; neutral; abrupt smooth boundary.

BE—9 to 15 inches; dark yellowish brown (10YR 4/4) silty clay loam (29 percent clay); weak fine subangular blocky structure; friable; few faint brown (10YR 4/3) clay films; common prominent silt coatings, white (10YR 8/2) dry; few very fine roots; slightly acid; gradual smooth boundary.

Bt1—15 to 22 inches; yellowish brown (10YR 5/4) silty clay loam (39 percent clay); moderate fine angular

blocky structure; friable; thin discontinuous clay films; common prominent silt coatings, white (10YR 8/2) dry; few very fine roots; medium acid; gradual smooth boundary.

Bt2—22 to 31 inches; yellowish brown (10YR 5/4) silty clay loam (38 percent clay); common fine distinct strong brown (7.5YR 4/6) and few fine distinct light brownish gray (2.5Y 6/2) mottles; weak fine prismatic structure parting to moderate medium angular blocky; firm; thin discontinuous clay films; common prominent silt coatings, white (10YR 8/2) dry; few very fine roots; few dark concretions (manganese oxide); medium acid; gradual smooth boundary.

Bt3—31 to 40 inches; yellowish brown (10YR 5/4) silty clay loam (35 percent clay); common fine distinct light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; firm; thin continuous clay films; few prominent coatings, white (10YR 8/2) dry; few very fine roots; few dark concretions (manganese oxide); medium acid; gradual smooth boundary.

Bt4—40 to 49 inches; yellowish brown (10YR 5/4) silty clay loam (35 percent clay); many medium and fine distinct light brownish gray (2.5Y 6/2), common fine distinct yellowish brown (10YR 5/8), and common medium prominent strong brown (7.5YR 5/8 and 4/6) mottles; weak fine prismatic structure parting to weak medium subangular blocky; firm; thin discontinuous clay films; few prominent silt coatings, light gray (10YR 7/2) dry; few dark concretions (manganese oxide); medium acid; gradual smooth boundary.

BC—49 to 60 inches; light olive brown (2.5Y 5/4) silty clay loam (32 percent clay); many medium and fine light brownish gray (2.5Y 6/2) and common fine distinct yellowish brown (10YR 5/8) and yellowish red (5YR 4/6) mottles; weak medium subangular blocky structure; friable; very few discontinuous clay films; very few prominent silt coatings, light gray (10YR 7/2) dry; slightly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The surface layer is 1 to 9 inches thick.

The Ap horizon has value of 3 or 4 and chroma of 1 to 4. It is neutral to medium acid. The E horizon, if it occurs, has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has a clay content of 35 to 42 percent. It typically is strongly acid to medium acid. The Bt and BC horizons have value of 4 and 5 and chroma of 3 or 4.

Coland Series

The Coland series consists of poorly drained, moderately permeable soils on flood plains. These soils formed in loamy alluvium. The native vegetation was prairie grasses. Slopes range from 0 to 2 percent.

Typical pedon of Coland clay loam, 0 to 2 percent slopes, in an area of cropland; 1,000 feet east and 54 feet north of the center of sec. 13, T. 75 N., R. 3 W.

Ap—0 to 9 inches; black (N 2/0) clay loam (29 percent clay), very dark gray (N 3/0) dry; weak very fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

A1—9 to 20 inches; black (N 2/0) clay loam, very dark gray (N 3/0) dry; weak fine granular structure; friable; few fine roots; neutral; gradual smooth boundary.

A2—20 to 30 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; common fine distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; few fine roots; slightly acid; gradual smooth boundary.

A3—30 to 39 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; common fine and medium prominent yellowish red (5YR 5/8) mottles; weak fine subangular blocky structure; friable; few fine roots; slightly acid; gradual smooth boundary.

AC—39 to 48 inches; black (10YR 2/1) and dark olive gray (5Y 3/2) clay loam; common fine distinct olive brown (2.5Y 4/4) mottles; weak medium subangular blocky structure; friable; slightly acid; clear smooth boundary.

Cg—48 to 60 inches; stratified dark gray (5Y 4/1) sandy clay loam and sandy loam; common medium prominent yellowish brown (10YR 5/8), common fine prominent yellowish red (5YR 4/6), and common fine distinct light olive brown (2.5Y 5/4) mottles; massive; friable; very dark gray (5Y 3/1) krotovina 1 inch in diameter; slightly acid.

The thickness of the solum ranges from 36 to about 48 inches. The mollic epipedon is more than 36 inches thick.

The A horizon has value of 2 or 3 and chroma of 0 or 1. It is neutral to medium acid. The Bg horizon, if it occurs, has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 3 or 4 and chroma of 0 or 1. It is slightly acid or neutral. The content of clay in this horizon is 27 to 35 percent. The Cg horizon has hue of 10YR, 2.5Y, or 5Y, value of 2 to 5, and chroma of 1 to 4. It generally is clay loam to loam but has thin strata of silty clay to loamy sand. Some pedons have sandy or gravelly material below a depth of 48 inches.

Colo Series

The Colo series consists of poorly drained, moderately permeable soils on flood plains. These soils formed in silty sediments. The native vegetation was prairie grasses. Slopes range from 0 to 2 percent.

Typical pedon of Colo silty clay loam, 0 to 2 percent slopes, in an area of cropland; 910 feet north and 110

feet east of the southwest corner of sec. 31, T. 74 N., R. 4 W.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam (33 percent clay), very dark gray (10YR 3/1) dry; moderate fine granular structure; friable; common fine roots; some undecomposed plant material; neutral; gradual smooth boundary.

A1—8 to 18 inches; black (10YR 2/1) silty clay loam (33 percent clay), very dark gray (10YR 3/1) dry; weak fine subangular blocky structure parting to moderate fine granular; friable; common fine roots; slightly acid; gradual wavy boundary.

A2—18 to 25 inches; black (N 2/0) silty clay loam (33 percent clay), very dark gray (10YR 3/1) dry; weak very fine subangular blocky structure; friable; common fine roots; slightly acid; gradual wavy boundary.

A3—25 to 36 inches; black (N 2/0) silty clay loam (33 percent clay), very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; friable; few fine roots; slightly acid; gradual wavy boundary.

A4—36 to 42 inches; very dark gray (10YR 3/1) silty clay loam (33 percent clay), dark gray (10YR 4/1) dry; black (10YR 2/1) coatings on faces of peds; few fine faint dark gray (10YR 4/1) mottles; moderate fine subangular blocky structure; friable; slightly acid; clear wavy boundary.

AB—42 to 49 inches; very dark gray (10YR 3/1) silty clay loam (33 percent clay), dark gray (10YR 4/1) dry; black (10YR 2/1) coatings on faces of some peds; common fine faint grayish brown (10YR 5/2) and few fine distinct yellowish brown (10YR 5/4) mottles; moderate fine subangular blocky structure; friable; slightly acid; clear wavy boundary.

Bg—49 to 56 inches; gray (10YR 5/1) silty clay loam (29 percent clay); dark gray (10YR 4/1) coatings on faces of peds; common fine distinct yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; very dark gray (10YR 3/1) krotovina, about 2 inches in diameter, at a depth of about 55 inches; slightly acid; gradual wavy boundary.

BCg—56 to 60 inches; gray (5Y 5/1) silty clay loam (29 percent clay); many fine prominent yellowish brown (10YR 5/4) mottles; weak medium prismatic structure; friable; dark gray (10YR 4/1) stains on faces of some prisms; slightly acid.

The thickness of the solum ranges from 36 to about 60 inches. The mollic epipedon is more than 36 inches thick.

The A horizon has 10YR or 5Y or is neutral in hue. It has value of 2 or 3 and chroma of 0 or 1. It typically is silty clay loam, but in some pedons the upper 10 inches is silt loam. The content of clay between depths of 10 and 40 inches is 30 to 35 percent. It is as high as 38 percent in thin layers. The Bg horizon has hue of 10YR or 5Y or is neutral in hue. It has value of 3 to 5 and chroma of 0 to 1. It is neutral or slightly acid.

Coppock Series

The Coppock series consists of somewhat poorly drained, moderately permeable soils on stream terraces and foot slopes. These soils formed in silty alluvium. The native vegetation was mixed prairie grasses and deciduous trees. Slopes range from 0 to 5 percent.

Typical pedon of Coppock silt loam, 0 to 2 percent slopes, in an area of cropland; 1,420 feet west and 100 feet north of the center of sec. 25, T. 75 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam (21 percent clay), grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

E1—9 to 13 inches; dark grayish brown (10YR 4/2) silt loam (21 percent clay), light gray (10YR 7/2) dry; mixed with some very dark grayish brown (10YR 3/2) material in the upper part; weak thin platy structure; friable; many fine roots; medium acid; clear smooth boundary.

E2—13 to 28 inches; grayish brown (10YR 5/2) silt loam (21 percent clay), light gray (10YR 7/2) dry; few fine distinct dark brown (7.5YR 3/2) and brown (7.5YR 4/4) mottles; weak medium platy structure; friable; few fine roots; strongly acid; clear smooth boundary.

Btg1—28 to 33 inches; grayish brown (10YR 5/2) silty clay loam (29 percent clay); dark grayish brown (10YR 4/2) coatings on faces of peds; few fine distinct dark brown (7.5YR 3/2) and brown (7.5YR 4/4) mottles; weak fine subangular blocky structure; friable; few thin patchy clay films; few dark concretions (manganese oxide); medium acid; gradual smooth boundary.

Btg2—33 to 42 inches; grayish brown (10YR 5/2) silty clay loam (33 percent clay); common medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure parting to weak fine subangular blocky; friable; thin nearly continuous clay films; few fine dark concretions (manganese oxide); medium acid; gradual smooth boundary.

Btg3—42 to 48 inches; grayish brown (10YR 5/2) silty clay loam (33 percent clay); very dark gray (10YR 3/1) coatings on faces of peds; common fine distinct strong brown (7.5YR 5/6) and few fine faint light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; thin nearly continuous clay films; medium acid; gradual smooth boundary.

Btg4—48 to 60 inches; grayish brown (10YR 5/2) silty clay loam (33 percent clay); very dark gray (10YR 3/1) coatings on faces of peds; common fine and medium distinct strong brown (7.5YR 5/6), common

fine distinct very dark grayish brown (10YR 3/2), and few fine faint light brownish gray (10YR 6/2) mottles; weak medium prismatic structure parting to weak fine and medium subangular blocky; friable; thin discontinuous clay films; medium acid.

The thickness of the solum ranges from 45 to more than 60 inches. The surface layer is 6 to 10 inches thick.

The A or Ap horizon has value of 3 and chroma of 1 or 2. It is medium acid to neutral. The E horizon has value of 4 to 6 and chroma of 1 or 2. It ranges from strongly acid to neutral. The Btg horizon has value of 4 or 5 and chroma of 1 or 2 and has mottles with higher value and chroma. It generally is strongly acid or medium acid. The content of clay in the upper 20 inches of this horizon ranges from 27 to 35 percent.

Dickinson Series

The Dickinson series consists of well drained soils on stream terraces and uplands. These soils formed in loamy and sandy alluvial sediments reworked by the wind. The native vegetation was prairie grasses. Permeability is moderately rapid in the solum and rapid in the substratum. Slopes range from 0 to 5 percent.

Typical pedon of Dickinson fine sandy loam, 0 to 2 percent slopes, in an area of cropland; 1,000 feet east and 350 feet north of the center of sec. 35, T. 75 N., R. 4 W.

Ap—0 to 9 inches; very dark brown (10YR 2/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak fine and medium granular structure; very friable; very few fine roots; neutral; abrupt smooth boundary.

A1—9 to 15 inches; very dark brown (10YR 2/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; very few fine roots; neutral; clear smooth boundary.

A2—15 to 20 inches; very dark grayish brown (10YR 3/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; slightly acid; clear smooth boundary.

Bw—20 to 32 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 4/3) dry; weak fine subangular blocky structure; very friable; slightly acid; clear smooth boundary.

BC—32 to 38 inches; dark yellowish brown (10YR 3/4) fine sandy loam; weak medium subangular blocky structure; very friable; slightly acid; clear smooth boundary.

2C1—38 to 50 inches; dark yellowish brown (10YR 3/4) fine sand; single grained; loose; slightly acid; gradual smooth boundary.

2C2—50 to 60 inches; dark yellowish brown (10YR 4/4) fine sand; single grained; loose; slightly acid.

The thickness of the solum ranges from 30 to 50 inches. The thickness of the mollic epipedon ranges from 18 to 36 inches.

The A horizon has value and chroma of 2 or 3. The Bw horizon has value of 3 to 5 and chroma of 3 to 6. It is sandy loam, fine sandy loam, loamy fine sand, loamy sand, or fine sand. The BA, Bw, and BC horizons are neutral to medium acid. The C horizon has value and chroma of 3 to 6.

Douds Series

The Douds series consists of well drained, moderately permeable soils on side slopes on high benches. These soils formed in alluvial sediments. The native vegetation was deciduous trees. Slopes range from 14 to 40 percent.

Typical pedon of Douds loam, in an area of Douds-Lindley loams, 25 to 40 percent slopes, in a pasture; 2,300 feet east and 920 feet north of the southwest corner of sec. 31, T. 74 N., R. 2 W.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak very fine granular structure; friable; many fine roots; slightly acid; clear smooth boundary.

E—5 to 9 inches; brown (10YR 4/3) loam, brown (10YR 5/3) dry; very dark grayish brown (10YR 3/2) coatings on faces of some peds; weak fine granular structure; friable; many fine roots; medium acid; gradual wavy boundary.

Bt1—9 to 14 inches; brown (10YR 4/3) clay loam; weak fine subangular blocky structure; friable; thin patchy clay films; dark brown (10YR 3/3) coatings on faces of a few peds; common fine roots; strongly acid; gradual wavy boundary.

Bt2—14 to 20 inches; yellowish brown (10YR 5/4) clay loam; moderate fine subangular and angular blocky structure; firm; very thin brown (10YR 4/3) continuous clay films; common fine roots; strongly acid; gradual wavy boundary.

Bt3—20 to 27 inches; yellowish brown (10YR 5/4) clay loam; weak medium prismatic structure parting to moderate fine subangular and angular blocky; very thin continuous dark yellowish brown (10YR 4/4) clay films; few fine roots; very dark grayish brown (10YR 3/2) stains in old root channels; strongly acid; clear wavy boundary.

Bt4—27 to 36 inches; yellowish brown (10YR 5/4) sandy clay loam; weak medium prismatic structure parting to weak fine subangular blocky; friable; very thin patchy clay films on faces of peds; dark stains on faces of some peds; few fine roots; strongly acid; gradual wavy boundary.

BC—36 to 45 inches; pale brown (10YR 6/3) sandy loam; weak medium prismatic structure; very friable; very thin patchy yellowish brown (10YR 5/4) clay

films on vertical faces of prisms; strongly acid; clear wavy boundary.

C1—45 to 53 inches; yellowish brown (10YR 5/4) sandy loam; massive; very friable; medium acid; clear wavy boundary.

C2—53 to 60 inches; light yellowish brown (10YR 6/4) sandy loam; massive; very friable; medium acid.

The thickness of the solum ranges from 36 to more than 60 inches. The surface layer is 2 to 6 inches thick. The E horizon is 0 to 8 inches thick.

The A horizon has value of 3 to 5 and chroma of 1 to 3. The E horizon has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 8. It is loam, clay loam, or sandy clay loam. The BC and C horizons are stratified loamy sand, sandy loam, loam, sandy clay loam, or clay loam.

Downs Series

The Downs series consists of well drained, moderately permeable soils on ridges and convex side slopes in the uplands. These soils formed in loess. The native vegetation was grasses and trees. Slopes range from 2 to 14 percent.

Typical pedon of Downs silt loam, 2 to 5 percent slopes, in an area of cropland; 180 feet west and 2,550 feet north of the southeast corner of sec. 16, T. 75 N., R. 3 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam (21 percent clay), grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine roots; slightly acid; abrupt smooth boundary.

Bt1—9 to 15 inches; dark yellowish brown (10YR 4/4) silty clay loam (29 percent clay); weak very fine angular blocky structure; friable; very thin patchy clay films; many distinct silt coatings, light gray (10YR 7/2) dry; few very fine roots; medium acid; clear smooth boundary.

Bt2—15 to 21 inches; yellowish brown (10YR 5/4) silty clay loam (33 percent clay); moderate fine and very fine angular blocky structure; very thin discontinuous dark yellowish brown (10YR 4/4) clay films; many distinct silt coatings, light gray (10YR 7/2) dry; few very fine roots; medium acid; gradual smooth boundary.

Bt3—21 to 28 inches; yellowish brown (10YR 5/4) silty clay loam (33 percent clay); moderate fine angular blocky structure; friable; thin nearly continuous clay films; common distinct silt coatings, light gray (10YR 7/2) dry; few very fine roots; medium acid; gradual smooth boundary.

Bt4—28 to 37 inches; yellowish brown (10YR 5/4) silty clay loam (33 percent clay); common fine distinct light brownish gray (2.5Y 6/2) mottles; moderate fine prismatic structure parting to moderate medium angular blocky; friable; thin nearly continuous clay films; common distinct silt coatings, light gray (10YR 7/2) dry; few very fine roots; medium acid; gradual smooth boundary.

Bt5—37 to 48 inches; yellowish brown (10YR 5/4) silty clay loam (33 percent clay); common fine faint yellowish brown (10YR 5/6) and common fine distinct strong brown (7.5YR 5/6) and light brownish gray (2.5Y 6/2) mottles; weak fine prismatic structure parting to weak medium subangular blocky; friable; thin discontinuous clay films; few distinct silt coatings, light gray (10YR 7/2) dry; few very fine roots; medium acid; diffuse smooth boundary.

Bt6—48 to 60 inches; yellowish brown (10YR 5/4) silty clay loam (29 percent clay); common fine faint yellowish brown (10YR 5/6) and common fine distinct light brownish gray (2.5Y 6/2) mottles; weak medium prismatic structure; friable; thin discontinuous clay films; very few distinct silt coatings, light gray (10YR 7/2) dry; medium acid.

The thickness of the solum ranges from 42 to more than 60 inches. The A or Ap horizon is 6 to 9 inches thick. It has value of 2 or 3 and chroma of 1 or 2. It is neutral to medium acid. The E horizon, if it occurs, has value of 3 or 4 and chroma of 2 or 3. The Bt horizon commonly has value of 4 or 5 and chroma of 3 or 4. It is medium acid to very strongly acid. The content of clay in this horizon ranges from 27 to 35 percent.

Elrick Series

The Elrick series consists of well drained soils on flood plains along rivers. These soils formed in alluvium. The native vegetation was grasses. Permeability is moderately rapid in the solum and very rapid in the substratum. Slopes range from 0 to 2 percent.

Typical pedon of Elrick sandy loam, 0 to 2 percent slopes, in an area of cropland; 42 feet north and 2,400 feet west of the southeast corner of sec. 8, T. 74 N., R. 2 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; common very fine roots; neutral; abrupt smooth boundary.

A—10 to 14 inches; dark brown (10YR 3/3) sandy loam, brown (10YR 5/3) dry; weak fine granular structure; very friable; few very fine roots; few fine dark concretions (manganese oxide); neutral; clear smooth boundary.

Bw1—14 to 19 inches; brown (7.5YR 4/4) sandy loam; weak fine subangular blocky structure; very friable; few very fine roots; few fine dark concretions (manganese oxide); neutral; clear wavy boundary.

Bw2—19 to 28 inches; brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; very friable; few very fine roots; few fine dark concretions (manganese oxide); neutral; clear wavy boundary.

C1—28 to 34 inches; brown (7.5YR 4/4) sandy loam; massive; very friable; few fine roots; few fine dark concretions (manganese oxide); slightly acid; clear wavy boundary.

C2—34 to 40 inches; dark brown (7.5YR 3/4) sand; single grained; loose; medium acid; abrupt wavy boundary.

C3—40 to 60 inches; dark yellowish brown (10YR 4/4) sand; single grained; loose; slightly acid.

The solum ranges from 20 to 36 inches in thickness. It is medium acid to neutral. The thickness of the mollic epipedon ranges from 10 to 20 inches.

The A horizon has value and chroma of 2 or 3. It generally is sandy loam, but the range includes loam. The Bw horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 or 4. It generally is sandy loam but in some pedons is loamy sand in the lower part. The C horizon generally is loamy sand or sand and has thin layers of sandy loam or loam in the upper part.

Ely Series

The Ely series consists of somewhat poorly drained, moderately permeable soils on foot slopes and alluvial fans. These soils formed in silty local alluvium. The native vegetation was prairie grasses. Slopes range from 2 to 5 percent.

Typical pedon of Ely silty clay loam, 2 to 5 percent slopes, in an area of cropland; 850 feet east and 1,600 feet north of the southwest corner of sec. 12, T. 75 N., R. 4 W.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine roots; neutral; abrupt smooth boundary.

A1—8 to 16 inches; very dark brown (10YR 2/2) silty clay loam, grayish brown (10YR 5/2) dry; few fine distinct dark yellowish brown (10YR 4/4) mottles in the lower part; weak fine granular structure; friable; common very fine roots; slightly acid; gradual smooth boundary.

A2—16 to 27 inches; very dark brown (10YR 2/2) silty clay loam, grayish brown (10YR 5/2) dry; few fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium granular structure; friable; few very fine roots; slightly acid; clear smooth boundary.

Bg1—27 to 31 inches; dark grayish brown (10YR 4/2) silty clay loam; very dark gray (10YR 3/1) coatings on faces of peds; common fine distinct light olive brown (2.5Y 5/4) mottles; weak fine subangular blocky structure; friable; patchy silt coatings, light gray (10YR 7/2) dry; few very fine roots; few fine dark concretions (manganese oxide); slightly acid; clear wavy boundary.

Bg2—31 to 38 inches; grayish brown (2.5Y 5/2) silty clay loam; very dark gray (10YR 3/1) coatings on faces of a few peds; many fine distinct light olive brown (2.5Y 5/4), common fine distinct yellowish brown (10YR 5/6), and few fine distinct strong brown (7.5YR 5/6) mottles; weak fine and medium subangular blocky structure; friable; patchy silt coatings, light gray (10YR 7/2) dry; few very fine roots; few dark concretions (manganese oxide); slightly acid; gradual wavy boundary.

Bg3—38 to 47 inches; grayish brown (2.5Y 5/2) silty clay loam; very dark gray (10YR 3/1) coatings on faces of a few peds; many fine distinct light olive brown (2.5Y 5/6), common fine distinct yellowish brown (10YR 5/6), and few fine prominent strong brown (7.5YR 4/6) mottles; weak fine and medium subangular blocky structure; friable; patchy silt coatings, light gray (10YR 7/2) dry; few very fine roots; few fine dark concretions (manganese oxide); slightly acid; gradual wavy boundary.

BCg—47 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine distinct light olive brown (2.5Y 5/6), common fine distinct yellowish brown (10YR 5/6), and few fine prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure; friable; few fine dark concretions (manganese oxide); neutral.

The thickness of the solum ranges from 48 to more than 60 inches. The thickness of the mollic epipedon ranges from 24 to 36 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It generally is silty clay loam, but in some areas it is silt loam. The Bg horizon has value of 4 or 5 and chroma of 2 to 4. It is medium acid to neutral. The content of clay in this horizon ranges from 28 to 35 percent.

Fayette Series

The Fayette series consists of well drained, moderately permeable soils on convex ridgetops and side slopes in the uplands. These soils formed in loess. The native vegetation was deciduous trees. Slopes range from 2 to 25 percent.

Typical pedon of Fayette silt loam, 2 to 5 percent slopes, in an area of cropland; 72 feet east and 300 feet north of the southwest corner of sec. 6, T. 74 N., R. 2 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam (21 percent clay), light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

E—8 to 11 inches; brown (10YR 5/3) silt loam (21 percent clay), pale brown (10YR 6/3) dry; weak thin platy structure; friable; few fine roots; slightly acid; clear smooth boundary.

Bt1—11 to 18 inches; yellowish brown (10YR 5/4) silty clay loam (31 percent clay); weak very fine and fine angular blocky structure; friable; thin discontinuous clay films; thin nearly continuous silt coatings, light gray (10YR 7/2) dry; few fine roots; medium acid; gradual smooth boundary.

Bt2—18 to 32 inches; yellowish brown (10YR 5/4) silty clay loam (34 percent clay); moderate fine and very fine angular blocky structure; friable; thin discontinuous clay films; thin discontinuous silt coatings, light gray (10YR 7/2) dry; few fine roots; strongly acid; gradual smooth boundary.

Bt3—32 to 48 inches; yellowish brown (10YR 5/4) silty clay loam (32 percent clay); few fine distinct strong brown (7.5YR 5/6) mottles; weak medium angular blocky structure; friable; thin nearly continuous clay films; few thin discontinuous silt coatings, light gray (10YR 7/2) dry; few fine roots; strongly acid; gradual smooth boundary.

BC—48 to 60 inches; yellowish brown (10YR 5/4) silty clay loam (29 percent clay); dark yellowish brown (10YR 4/4) coatings on faces of peds; few fine distinct light brownish gray (2.5Y 6/2) and common fine faint yellowish brown (10YR 5/6) mottles; weak fine prismatic structure; friable; few thin discontinuous clay films; few dark concretions (manganese oxide); medium acid.

The thickness of the solum ranges from 42 to more than 60 inches. The A horizon is 1 to 4 inches thick. It is very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), or very dark brown (10YR 2/2). It is neutral to medium acid. Pedons in cultivated or eroded areas have an Ap horizon, which is dark grayish brown (10YR 4/2) or brown (10YR 4/3). The E horizon, if it occurs, has value of 3 to 5 and chroma of 1 to 4. The content of clay in the Bt horizon ranges from 27 to 35 percent.

Fruitfield Series

The Fruitfield series consists of excessively drained, very rapidly permeable soils on flood plains. These soils formed in sandy alluvium. The native vegetation was prairie grasses. Slopes range from 0 to 3 percent.

Typical pedon of Fruitfield sand, 0 to 3 percent slopes, in an area of cropland; 525 feet east and 1,250 feet south of the northwest corner of sec. 6, T. 75 N., R. 2 W.

Ap—0 to 7 inches; dark brown (7.5YR 3/2) sand, brown (7.5YR 4/2) dry; weak fine granular structure; very friable; few fine roots; neutral; clear smooth boundary.

A1—7 to 14 inches; dark brown (7.5YR 3/2) sand, brown (7.5YR 4/2) dry; weak fine subangular blocky structure; very friable; neutral; clear smooth boundary.

A2—14 to 20 inches; dark brown (7.5YR 3/2) sand, brown (7.5YR 4/2) dry; weak medium subangular blocky structure; very friable; medium acid; clear wavy boundary.

AC—20 to 38 inches; brown (7.5YR 4/4) sand; single grained; loose; medium acid; clear wavy boundary.

C1—38 to 47 inches; stratified dark yellowish brown (10YR 4/6), yellowish brown (10YR 5/6), and dark brown (7.5YR 3/4) coarse sand; single grained; loose; medium acid; clear wavy boundary.

C2—47 to 51 inches; brown (7.5YR 5/4) coarse sand; single grained; loose; slightly acid; clear wavy boundary.

C3—51 to 54 inches; dark brown (7.5YR 3/4) coarse sand; single grained; loose; slightly acid; clear wavy boundary.

C4—54 to 60 inches; yellowish brown (10YR 5/6) coarse sand; single grained; loose; slightly acid.

The solum ranges from 24 to 48 inches in thickness. It is neutral to medium acid. The thickness of the mollic epipedon ranges from 12 to 24 inches.

The A horizon has value of 2 or 3 and chroma of 1 to 3. It generally is sand, but the range includes loamy sand. The C horizon has value of 3 to 5 and chroma of 3 to 6.

Gara Series

The Gara series consists of well drained, moderately slowly permeable soils on side slopes dissected by drainageways. These soils formed in glacial till. The native vegetation was mixed prairie grasses and deciduous trees. Slopes range from 9 to 14 percent.

Typical pedon of Gara loam, 9 to 14 percent slopes, moderately eroded, in a pasture; 720 feet west and 1,010 feet north of the southeast corner of sec. 8, T. 74 N., R. 5 W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; mixed with streaks and pockets of brown (10YR 4/3) clay loam subsoil material; weak fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

Bt1—7 to 13 inches; brown (10YR 4/3) clay loam; moderate fine and very fine subangular blocky structure; friable; common fine roots; thin discontinuous clay films; common pebbles; medium acid; clear wavy boundary.

Bt2—13 to 22 inches; yellowish brown (10YR 5/4) clay loam; few fine faint yellowish brown (10YR 5/6)

mottles; moderate fine and medium subangular blocky structure; friable; thin nearly continuous clay films; patchy sand and silt coatings, very pale brown (10YR 7/3) dry; few fine roots; few fine dark concretions (manganese oxide); common pebbles; strongly acid; clear wavy boundary.

Bt3—22 to 31 inches; yellowish brown (10YR 5/4) clay loam; few fine faint yellowish brown (10YR 5/6) mottles; weak fine angular blocky structure; friable; thin continuous clay films on vertical faces of peds; thin discontinuous silt coatings, very pale brown (10YR 7/3) dry; few fine roots; few fine dark concretions (manganese oxide); few very dark brown (10YR 2/2) stains on faces of peds; common pebbles; strongly acid; clear wavy boundary.

Bt4—31 to 40 inches; yellowish brown (10YR 5/4) clay loam; few fine faint yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; thin discontinuous clay films; few fine roots; few very dark brown (10YR 2/2) stains on faces of peds; few fine dark concretions (manganese oxide); common pebbles; strongly acid; clear wavy boundary.

BC—40 to 47 inches; mottled yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) clay loam; common fine faint yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; firm; thin discontinuous clay films on faces of prisms; common fine dark concretions (manganese oxide); common pebbles; neutral; clear wavy boundary.

C—47 to 60 inches; mottled yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) clay loam; massive; friable; common fine dark concretions (manganese oxide); few pebbles; slight effervescence; neutral.

The thickness of the solum ranges from 36 to 60 inches. The surface layer is 6 to 9 inches.

The A or Ap horizon has value of 3 and chroma of 1 or 2. Unless limed, it is medium acid or slightly acid. The Bt horizon is medium acid or strongly acid. The C horizon has value of 4 or 5 and chroma of 4 to 6.

Garwin Series

The Garwin series consists of poorly drained, moderately permeable soils at the slightly concave head of upland drainageways. These soils formed in loess. The native vegetation was prairie grasses. Slopes range from 0 to 2 percent.

Typical pedon of Garwin silty clay loam, 0 to 2 percent slopes, in an area of cropland; 740 feet south and 108 feet west of the northeast corner of sec. 2, T. 75 N., R. 4 W.

Ap—0 to 8 inches; black (N 2/0) silty clay loam (34 percent clay), very dark gray (10YR 3/1) dry; weak fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

A—8 to 13 inches; black (10YR 2/1) silty clay loam (35 percent clay), dark gray (10YR 4/1) dry; few fine distinct dark olive gray (5Y 3/2) mottles; weak fine granular structure; friable; few fine roots; neutral; clear smooth boundary.

AB—13 to 18 inches; very dark gray (5Y 3/1) silty clay loam (33 percent clay), dark gray (10YR 4/1) dry; black (10YR 2/1) coatings on faces of many peds; few fine faint olive gray (5Y 4/2) mottles; weak fine granular and subangular blocky structure; friable; few fine roots; few fine pores; neutral; clear smooth boundary.

Bg1—18 to 25 inches; olive gray (5Y 4/2) silty clay loam (33 percent clay); black (10YR 2/1) and dark gray (5Y 4/1) coatings on faces of some peds; common fine faint olive (5Y 5/4) mottles; weak fine subangular blocky structure; friable; few fine pores; neutral; clear smooth boundary.

Bg2—25 to 30 inches; olive gray (5Y 4/2) silty clay loam (34 percent clay); dark gray (5Y 4/1) coatings on faces of some peds; common fine distinct light yellowish brown (2.5Y 6/4) and olive yellow (2.5Y 6/6) and common fine faint olive (5Y 5/4) mottles; weak fine prismatic structure parting to weak fine subangular blocky; friable; few fine roots; few fine pores; few fine dark concretions (manganese oxide); few black (10YR 2/1) stains on faces of some peds; neutral; clear smooth boundary.

Bg3—30 to 37 inches; olive gray (5Y 5/2) silty clay loam (35 percent clay); gray (5Y 5/1) and dark gray (5Y 4/1) coatings on faces of some peds; common fine faint olive (5Y 5/4) and common fine distinct light olive brown (2.5Y 5/4) and olive yellow (2.5Y 6/6 and 6/8) mottles; weak fine prismatic structure parting to weak medium subangular blocky; friable; few fine pores; few fine dark concretions (manganese oxide); neutral; gradual smooth boundary.

BCg—37 to 47 inches; olive gray (5Y 5/2) silty clay loam (33 percent clay); common fine prominent strong brown (7.5YR 4/6) and common medium distinct yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) mottles; weak fine prismatic structure parting to weak medium subangular blocky; friable; few fine pores; neutral; clear smooth boundary.

Cg—47 to 60 inches; olive gray (5Y 5/2) silty clay loam (30 percent clay); few medium faint dark gray (5Y 4/1) mottles in the upper part and common fine prominent strong brown (7.5YR 4/6) and common medium distinct yellowish brown (10YR 5/6 and 5/8) mottles throughout; massive; friable; few fine pores; neutral.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 13 to 24 inches.

The A horizon has value of 2 or 3 and chroma of 0 or 1. It is neutral to medium acid. The Bg horizon has hue of 2.5Y or 5Y, value of 4 or 5, and chroma of 1 or 2. It is slightly acid or neutral. Its clay content is 30 to 35 percent. The C horizon has colors similar to those of the Bg horizon.

Gilford Series

The Gilford series consists of very poorly drained soils on stream terraces. These soils formed in loamy and sandy alluvium. The native vegetation was prairie grasses. Permeability is moderately rapid in the upper part of the profile and rapid in the lower part. Slopes range from 0 to 2 percent.

Typical pedon of Gilford fine sandy loam, 0 to 2 percent slopes, in an area of cropland; 1,600 feet north of the center of sec. 28, T. 74 N., R. 4 W.

Ap—0 to 7 inches; black (10YR 2/1) fine sandy loam, very dark gray (10YR 3/1) dry; weak very fine granular structure; very friable; common fine roots; slightly acid; abrupt smooth boundary.

A1—7 to 16 inches; black (10YR 2/1) fine sandy loam, very dark gray (10YR 3/1) dry; weak fine and very fine granular structure; very friable; few fine roots; medium acid; gradual smooth boundary.

A2—16 to 23 inches; black (10YR 2/1) fine sandy loam, very dark gray (10YR 3/1) dry; weak fine granular structure; very friable; few fine roots; medium acid; clear smooth boundary.

Bg1—23 to 30 inches; dark gray (5Y 4/1) fine sandy loam; very dark gray (5Y 3/1) coatings on faces of peds; few fine faint olive gray (5Y 4/2) mottles; weak fine subangular blocky structure; very friable; few fine roots; slightly acid; clear smooth boundary.

Bg2—30 to 36 inches; olive gray (5Y 5/2) fine sandy loam; dark gray (5Y 4/1) coatings on faces of some peds; common fine faint gray (5Y 5/1) mottles; weak medium subangular structure; very friable; black (10YR 2/1) krotovina 1 inch in diameter; slightly acid; clear smooth boundary.

Bg3—36 to 42 inches; mottled gray (5Y 5/1) and dark gray (5Y 4/1) loamy sand; weak medium and coarse subangular blocky structure; very friable; slightly acid; abrupt smooth boundary.

Cg1—42 to 53 inches; olive gray (5Y 5/2) sand; single grained; loose; 2 to 5 percent gravel; slightly acid; gradual smooth boundary.

Cg2—53 to 60 inches; dark grayish brown (2.5Y 4/2) and light olive brown (2.5Y 5/4) sand; single grained; loose; 3 to 5 percent gravel; slightly acid.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 14 to 24 inches.

The A horizon has value of 2 or 3 and chroma of 0 or 1. It is medium acid to neutral. The B horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 or 2. It is medium acid or slightly acid. The colors of the Cg horizon are similar to those of the B horizon.

Givin Series

The Givin series consists of somewhat poorly drained, moderately slowly permeable soils on the tops of ridges in the uplands. These soils formed in loess. The native vegetation was mixed prairie grasses and deciduous trees. Slopes range from 0 to 5 percent.

Typical pedon of Givin silt loam, 0 to 2 percent slopes, in an area of cropland; 1,950 feet south and 450 feet west of the northeast corner of sec. 13, T. 73 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam (21 percent clay), grayish brown (10YR 5/2) dry; weak fine granular structure; friable; neutral; abrupt smooth boundary.

E—9 to 12 inches; dark grayish brown (10YR 4/2) silt loam (21 percent clay), light brownish gray (10YR 6/2) dry; weak thin platy structure; friable; neutral; clear smooth boundary.

BE—12 to 16 inches; brown (10YR 5/3) silty clay loam (38 percent clay); dark brown (10YR 3/3) coatings on faces of some peds; common fine faint grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) mottles; weak fine subangular blocky structure; friable; few distinct silt coatings, light gray (10YR 7/2) dry; medium acid; clear smooth boundary.

Bt1—16 to 24 inches; grayish brown (10YR 5/2) silty clay loam (38 percent clay); few fine faint yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; thin discontinuous clay films; common distinct silt coatings, light gray (10YR 7/2) dry; firm; medium acid; clear smooth boundary.

Bt2—24 to 35 inches; mottled grayish brown (2.5Y 5/2) and brown (10YR 5/3) silty clay loam (38 percent clay); common fine distinct strong brown (7.5YR 5/6 and 5/8) mottles; thin discontinuous clay films; weak fine and medium subangular blocky structure; firm; dark gray (10YR 4/1) coatings in root channels; few fine dark concretions (manganese oxide); medium acid; clear smooth boundary.

Bt3—35 to 43 inches; grayish brown (2.5Y 5/2) silty clay loam (38 percent clay); few fine faint olive gray (5Y 5/2), common fine distinct yellowish brown (10YR 5/4), and few fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; thin discontinuous clay films; very dark gray

(10YR 3/1) fillings in root channels; medium acid; clear smooth boundary.

BC—43 to 54 inches; mottled grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/4) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to weak fine and medium subangular blocky; friable; thin clay films in root pores; slightly acid; clear smooth boundary.

C—54 to 60 inches; mottled olive gray (5Y 5/2) and yellowish brown (10YR 5/4) silty clay loam; few fine distinct dark brown (7.5YR 3/2) mottles; massive; friable; very dark gray (10YR 3/1) fillings in root pores; slightly acid.

The thickness of the solum ranges from 40 to 60 inches. The surface layer is 6 to 9 inches thick.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The E horizon has value of 4 or 5 and chroma of 2. The B horizon has hue of 10YR in the upper part and 2.5Y in the lower part. It has value of 4 or 5 and chroma of 2 or 3. It is medium acid or slightly acid. The content of clay ranges from 36 to 42 percent in the finest textured part of the Bt horizon. The BC and C horizons have hue of 2.5Y or 5Y, value of 4 or 5, and chroma of 2.

Hedrick Series

The Hedrick series consists of moderately well drained, moderately permeable soils in coves at the head of drainageways and on short, convex or plane side slopes in the uplands. These soils formed in loess. The native vegetation was mixed prairie grasses and deciduous trees. Slopes range from 2 to 14 percent.

Typical pedon of Hedrick silt loam, 5 to 9 percent slopes, moderately eroded, in an area of cropland; 510 feet east and 1,580 feet north of the southwest corner of sec. 36, T. 73 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam (25 percent clay), grayish brown (10YR 5/2) dry; mixed with streaks and pockets of dark yellowish brown (10YR 4/4) silty clay loam subsoil material; weak fine granular structure; friable; common very fine roots; neutral; abrupt smooth boundary.

Bt1—9 to 18 inches; dark yellowish brown (10YR 4/4) silty clay loam (33 percent clay); few fine faint yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; thin nearly continuous clay films; few distinct silt coatings, very pale brown (10YR 7/3) dry; few very fine roots; few fine dark concretions (manganese oxide); medium acid; clear wavy boundary.

Bt2—18 to 25 inches; grayish brown (2.5Y 5/2) silty clay loam (36 percent clay); few fine prominent strong brown (7.5YR 5/6) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; friable; thin nearly continuous clay films; thin patchy silt coatings, very pale brown (10YR 7/3) dry; few fine roots; common fine dark concretions (manganese oxide); strongly acid; gradual wavy boundary.

Bt3—25 to 33 inches; grayish brown (2.5Y 5/2) silty clay loam (30 percent clay); common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable; thin nearly continuous clay films; few very fine roots; few fine dark concretions (manganese oxide); strongly acid; gradual wavy boundary.

Bt4—33 to 39 inches; olive gray (5Y 5/2) silty clay loam (30 percent clay); few fine prominent yellowish brown (10YR 5/4) and common fine and medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; thin discontinuous clay films; few very fine roots; few fine dark concretions (manganese oxide); medium acid; gradual wavy boundary.

BC—39 to 52 inches; olive gray (5Y 5/2) silty clay loam (29 percent clay); few fine distinct yellowish brown (10YR 5/4) and few fine prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure; friable; common fine dark concretions (manganese oxide); medium acid; gradual wavy boundary.

C—52 to 60 inches; light olive gray (5Y 6/2) silty clay loam; common fine prominent strong brown (7.5YR 5/6) and few fine distinct yellowish brown (10YR 5/4) mottles; massive; few fine dark concretions (manganese oxide); medium acid.

The thickness of the solum ranges from 40 to more than 60 inches. The A or Ap horizon is 6 to 9 inches thick. It is medium acid to neutral. The A horizon has value of 2 or 3 and chroma of 1 or 2. The E horizon, if it occurs, has value of 3 to 5 and chroma of 2 or 3. The upper part of the Bt horizon has value of 4 or 5 and chroma of 2 to 4. Its clay content ranges from 27 to 37 percent. The lower part has hue of 10YR, 2.5Y, or 5Y, value of 5 or 6, and chroma of 1 or 2. The Bt horizon is slightly acid to strongly acid.

Hoopeston Series

The Hoopeston series consists of somewhat poorly drained soils on stream terraces. These soils formed in loamy and sandy alluvium that has been partly reworked by the wind. The native vegetation was prairie grasses. Permeability is moderately rapid in the solum and rapid in the substratum. Slope ranges from 0 to 2 percent.

Typical pedon of Hoopeston fine sandy loam, 0 to 2 percent slopes, in an area of cropland; 1,340 feet east

and 564 feet south of the northwest corner of sec. 27, T. 75 N., R. 4 W.

Ap—0 to 8 inches; very dark brown (10YR 2/2) fine sandy loam, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; common fine roots; neutral; abrupt smooth boundary.

AB—8 to 15 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; common fine distinct dark brown (7.5YR 3/4) mottles; weak fine granular structure; very friable; few fine roots; slightly acid; clear smooth boundary.

Bw1—15 to 22 inches; brown (10YR 4/3) fine sandy loam; common fine distinct grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) mottles; weak fine subangular blocky structure; very friable; few fine roots; slightly acid; gradual smooth boundary.

Bw2—22 to 29 inches; grayish brown (2.5Y 5/2) fine sandy loam; common medium distinct dark yellowish brown (10YR 4/6) and dark brown (7.5YR 3/4) mottles; weak fine and medium subangular blocky structure; very friable; few fine roots; medium acid; gradual smooth boundary.

BC—29 to 38 inches; light brownish gray (2.5Y 6/2) fine sandy loam; common medium distinct yellowish brown (10YR 5/6), dark yellowish brown (10YR 4/6), and dark brown (7.5YR 3/4) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; very friable; few fine roots; medium acid; clear smooth boundary.

C1—38 to 46 inches; mottled yellowish brown (10YR 5/8) and light brownish gray (2.5Y 6/2) fine sand; common medium distinct dark yellowish brown (10YR 4/6) and common fine prominent dark brown (7.5YR 3/4) mottles; single grained; loose; medium acid; abrupt smooth boundary.

C2—46 to 52 inches; light brownish gray (2.5Y 6/2) fine sand; common fine distinct light olive brown (2.5Y 5/4) and common fine prominent dark brown (7.5YR 3/4) mottles; single grained; loose; medium acid; clear smooth boundary.

C3—52 to 60 inches; mottled light brownish gray (2.5Y 6/2) and light olive brown (2.5Y 5/4) fine sand; common fine prominent dark brown (7.5YR 3/4) mottles; single grained; loose; medium acid.

The thickness of the solum ranges from 24 to 50 inches. The thickness of the mollic epipedon ranges from 12 to 20 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is dominantly fine sandy loam or loam, but the range includes sandy loam. This horizon is neutral to medium acid. The Bw horizon has value of 4 or 5 and chroma of 2 to 4. It typically is fine sandy loam or loamy sand, but the range includes sandy loam. This horizon is strongly acid to slightly acid.

Inton Series

The Inton series consists of moderately well drained, moderately permeable soils on short, convex or plane side slopes and around the head of drainageways in the uplands. These soils formed in loess. The native vegetation was deciduous trees. Slopes range from 2 to 14 percent.

Typical pedon of Inton silt loam, 5 to 9 percent slopes, moderately eroded, in a pasture; 1,300 feet west and 550 feet north of the southeast corner of sec. 34, T. 73 N., R. 3 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam (25 percent clay), light brownish gray (10YR 6/2) dry; mixed with streaks and pockets of yellowish brown (10YR 5/4) silty clay loam subsoil material; weak fine subangular blocky structure parting to weak very fine subangular blocky; friable; common fine roots; neutral; abrupt smooth boundary.

Bt1—6 to 11 inches; yellowish brown (10YR 5/4) silty clay loam (33 percent clay); moderate fine subangular blocky structure; friable; thin discontinuous clay films; silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine roots; few fine pores; medium acid; clear smooth boundary.

Bt2—11 to 16 inches; yellowish brown (10YR 5/4) silty clay loam (33 percent clay); common fine faint yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; friable; thin nearly continuous clay films; silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine roots; few fine pores; strongly acid; clear smooth boundary.

Bt3—16 to 21 inches; grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) silty clay loam (33 percent clay); common fine and medium faint yellowish brown (10YR 5/6) and few fine distinct strong brown (7.5YR 5/6) mottles; moderate fine angular blocky structure; friable; thin continuous clay films; silt coatings on faces of peds, very pale brown (10YR 7/3) dry; few fine roots; few fine pores; few fine dark concretions (manganese oxide); strongly acid; clear smooth boundary.

Bt4—21 to 27 inches; light olive gray (5Y 6/2) silty clay loam (33 percent clay); common fine distinct dark brown (7.5YR 4/4), strong brown (7.5YR 5/6), and yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; friable; thin continuous clay films; few fine roots; few fine pores; strongly acid; clear smooth boundary.

Bt5—27 to 36 inches; light olive gray (5Y 6/2) silty clay loam (29 percent clay); common fine distinct strong brown (7.5YR 5/6) and common medium distinct yellowish brown (10YR 5/8) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; thin discontinuous clay

films; few fine pores; strongly acid; gradual smooth boundary.

BC—36 to 45 inches; light olive gray (5Y 6/2) silt loam (25 percent clay); common coarse distinct yellowish brown (10YR 5/6) and few fine distinct brownish yellow (10YR 6/8) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few fine pores; few fine dark concretions (manganese oxide); medium acid; gradual smooth boundary.

C—45 to 60 inches; light olive gray (5Y 6/2) grading to light brownish gray (2.5Y 6/2) silt loam (25 percent clay); common medium distinct strong brown (7.5YR 5/6) and common fine distinct brownish yellow (10YR 6/8) mottles; massive; friable; few fine pores; medium acid.

The thickness of the solum ranges from 36 to 60 inches. Reaction is medium acid to neutral in the Ap horizon and slightly acid to strongly acid in the Bt horizon.

The Ap horizon is 5 to 9 inches thick. It has value of 3 or 4 and chroma of 1 to 3. It generally is silt loam, but the range includes silty clay loam. Some pedons have an E horizon. The upper part of the Bt horizon has value of 4 or 5 and chroma of 3 or 4. The lower part of the Bt horizon and the BC horizon have hue of 10YR, 2.5Y, or 5Y, value of 5 or 6, and chroma of 1 or 2. The content of clay in the Bt horizon ranges from 30 and 35 percent. Mottles and iron segregations with high value and chroma are throughout this horizon. The C horizon has colors similar to those of the BC horizon.

Kalona Series

The Kalona series consists of poorly drained, moderately slowly permeable soils on the tops of ridges in the uplands. These soils formed in loess. The native vegetation was prairie grasses. Slopes are 0 to 1 percent.

Typical pedon of Kalona silty clay loam, 0 to 1 percent slopes, in an area of cropland; 20 feet west and 100 feet north of the southeast corner of sec. 29, T. 73 N., R. 4 W.

Ap—0 to 8 inches; black (N 2/0) silty clay loam (37 percent clay), black (10YR 2/1) dry; weak fine angular blocky structure; firm; common fine roots; slightly acid; abrupt smooth boundary.

A—8 to 14 inches; black (10YR 2/1) silty clay loam (39 percent clay), very dark gray (10YR 3/1) dry; black (N 2/0) coatings on faces of peds; moderate very fine and fine subangular blocky structure; firm; few fine roots; neutral; clear smooth boundary.

BA—14 to 18 inches; very dark gray (5Y 3/1) silty clay (40 percent clay); few dark olive gray (5Y 3/2) peds in the lower part; black (5Y 2/1) coatings on faces of peds; moderate fine subangular blocky structure; firm; few fine pores; neutral; clear smooth boundary.

Bg1—18 to 23 inches; olive gray (5Y 4/2) silty clay (40 percent clay); many dark olive gray (5Y 3/2) coatings on faces of peds; common fine distinct olive (5Y 5/4) and few fine distinct light olive brown (2.5Y 5/6) mottles; weak fine prismatic structure parting to moderate fine subangular blocky; firm; few fine roots; few fine pores; neutral; clear smooth boundary.

Bg2—23 to 29 inches; olive gray (5Y 5/2) silty clay loam (38 percent clay); dark gray (5Y 4/1) coatings on faces of some peds; common fine distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) mottles; weak fine prismatic structure parting to moderate and weak fine subangular blocky; firm; few fine roots; few fine pores; neutral; clear smooth boundary.

Bg3—29 to 37 inches; olive gray (5Y 5/2) silty clay loam (36 percent clay); few olive gray (5Y 4/2) coatings on faces of peds; common fine distinct light olive brown (2.5Y 5/6) and common medium prominent strong brown (7.5YR 4/6) mottles; weak fine prismatic structure parting to weak fine and medium subangular blocky; friable; few fine roots; few fine pores; few fine very dark gray (10YR 3/1) organic fillings in old root channels; neutral; gradual smooth boundary.

Bg4—37 to 44 inches; olive gray (5Y 5/2) silty clay loam; common fine distinct light olive brown (2.5Y 5/6) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine pores; few fine very dark gray (10YR 3/1) organic fillings in old root channels; few fine dark concretions (manganese oxide); neutral; gradual smooth boundary.

BCg—44 to 52 inches; olive gray (5Y 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and few fine distinct light olive brown (2.5Y 5/6) mottles; weak medium subangular blocky structure; friable; few fine dark concretions (manganese oxide); neutral; gradual smooth boundary.

Cg—52 to 60 inches; olive gray (5Y 5/2) silty clay loam; few fine distinct olive yellow (2.5Y 6/6) and common fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; mildly alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 12 to 24 inches.

The A horizon has value of 2 and chroma of 0 or 1. The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 or 2. The A and Bg horizons range from medium acid to neutral. The content of clay in these horizons is 36 to 40 percent.

Keomah Series

The Keomah series consists of somewhat poorly drained, moderately slowly permeable soils on the tops of ridges in the uplands. These soils formed in loess. The native vegetation was deciduous trees. Slopes range from 0 to 2 percent.

Typical pedon of Keomah silt loam, 0 to 2 percent slopes, in an area of cropland; 590 feet east and 182 feet south of the northwest corner of sec. 33, T. 73 N., R. 3 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam (18 percent clay), light brownish gray (10YR 6/2) dry; weak very fine granular structure; friable; few fine roots; common fine dark concretions (manganese oxide); slightly acid; abrupt smooth boundary.

E—7 to 12 inches; brown (10YR 5/3) silt loam (23 percent clay), light gray (10YR 7/2) dry; common fine faint yellowish brown (10YR 5/4) and few fine faint dark grayish brown (10YR 4/2) mottles; weak medium platy structure parting to weak very fine subangular blocky; friable; few fine roots; few fine pores; slightly acid; clear smooth boundary.

Bt1—12 to 16 inches; yellowish brown (10YR 5/4) silty clay loam (34 percent clay); brown (10YR 4/3) and dark grayish brown (10YR 4/2) coatings on faces of peds; common fine faint dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure parting to moderate fine and very fine angular blocky; friable; thin discontinuous clay films; silt coatings, very pale brown (10YR 7/3) and light gray (10YR 7/2) dry; few fine roots; few fine pores; medium acid; clear smooth boundary.

Bt2—16 to 23 inches; yellowish brown (10YR 5/4) silty clay (42 percent clay); brown (10YR 5/3) and dark grayish brown (10YR 4/2) coatings on faces of peds; common fine faint yellowish brown (10YR 5/6) and dark grayish brown (10YR 4/2), few fine distinct strong brown (7.5YR 5/8), and few fine prominent yellowish red (5YR 4/6) mottles; moderate fine prismatic structure parting to moderate fine subangular blocky; firm; thin nearly continuous clay films; few fine roots; few fine pores; few fine dark concretions (manganese oxide); strongly acid; gradual smooth boundary.

Bt3—23 to 33 inches; grayish brown (2.5Y 5/2) silty clay loam (38 percent clay); many medium faint light olive brown (2.5Y 5/4) and few fine distinct strong brown (7.5YR 4/6) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; firm; thin nearly continuous clay films; few fine roots; few fine pores; few fine dark concretions (manganese oxide); strongly acid; gradual smooth boundary.

Bt4—33 to 40 inches; grayish brown (2.5Y 5/2) silty clay loam (32 percent clay); common medium distinct yellowish brown (10YR 5/8) and common fine distinct dark reddish brown (5YR 3/4) mottles; weak medium subangular blocky structure; friable; few thin discontinuous clay films; few fine roots; few fine pores; common fine dark concretions (manganese oxide); strongly acid; gradual smooth boundary.

Bt5—40 to 46 inches; light brownish gray (2.5Y 6/2) silty clay loam (32 percent clay); common medium distinct yellowish brown (10YR 5/8), few fine distinct brownish yellow (10YR 6/8), and few fine and medium distinct dark yellowish brown (10YR 4/6) mottles; weak medium subangular blocky structure; friable; very few thin discontinuous clay films; few fine black (10YR 2/1) fillings in old root channels; few fine dark concretions (manganese oxide); slightly acid; gradual smooth boundary.

C—46 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam (29 percent clay); few fine distinct yellowish brown (10YR 5/8) and common medium distinct brownish yellow (10YR 6/8) mottles; massive; friable; few fine black (10YR 2/1) and very dark grayish brown (10YR 3/2) fillings in old root channels; slightly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The surface layer is 2 to 8 inches thick.

The A or Ap horizon is medium acid to neutral. It has value of 3 or 4 and chroma of 1 or 2. Value is 3 only in undisturbed pedons where the surface layer is less than 3 inches thick or where it has value of 6 or more when dry. The E horizon has value of 4 or 5 and chroma of 1 to 3. The Bt horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 to 4. It is strongly acid to slightly acid. Its clay content ranges from 36 to 42 percent. The C horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 2 or 3.

Keswick Series

The Keswick series consists of moderately well drained, slowly permeable soils on short, convex side slopes and nose slopes in the uplands. These soils formed in a paleosol. The native vegetation was deciduous trees. Slopes range from 9 to 14 percent.

Typical pedon of Keswick loam, 9 to 14 percent slopes, moderately eroded, in an area of cropland; 890 feet east and 350 feet north of the southwest corner of sec. 30, T. 76 N., R. 5 W.

Ap—0 to 7 inches; brown (10YR 4/3) loam, light yellowish brown (10YR 6/4) dry; mixed with streaks and pockets of dark brown (10YR 3/3), dark yellowish brown (10YR 4/4), and strong brown (7.5YR 5/6) material from the subsoil; weak fine granular structure; friable; few fine roots; very strongly acid; abrupt smooth boundary.

BE—7 to 13 inches; strong brown (7.5YR 5/6) loam; few fine faint brown (7.5YR 4/4) mottles; weak fine subangular blocky structure; friable; few patchy silt and sand coatings, very pale brown (10YR 7/3) dry; few fine roots; very strongly acid; clear smooth boundary.

Bt1—13 to 18 inches; brown (7.5YR 4/4) clay loam; common fine distinct strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) and few fine faint grayish brown (10YR 5/2) mottles; weak fine and medium subangular blocky structure; friable; thin nearly continuous clay films; few fine roots; few fine dark concretions (manganese oxide); very strongly acid; clear smooth boundary.

Bt2—18 to 23 inches; mottled yellowish red (5YR 4/6) and brown (7.5YR 4/4) clay; common fine distinct brown (10YR 5/3) and few fine faint grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; firm; thin continuous clay films; few fine roots; few fine dark concretions (manganese oxide); many pebbles in the lower 2 inches; very strongly acid; clear smooth boundary.

2Bt3—23 to 29 inches; brown (7.5YR 4/4) clay; many fine distinct reddish brown (5YR 4/4) and yellowish red (5YR 4/6) mottles; moderate fine subangular blocky structure; firm; thin continuous clay films; few fine dark concretions (manganese oxide); common pebbles; very strongly acid; clear smooth boundary.

2Bt4—29 to 40 inches; strong brown (7.5YR 5/6) clay loam; common fine distinct brown (7.5YR 4/4) and few fine faint brown (7.5YR 4/4 and 10YR 5/3) and grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; firm; thin nearly continuous clay films; few fine roots; common medium dark concretions (manganese oxide); strongly acid; gradual smooth boundary.

2Bt5—40 to 49 inches; strong brown (7.5YR 5/6) clay loam; common fine faint strong brown (7.5YR 5/8) and few fine distinct dark brown (7.5YR 4/4) mottles; moderate fine subangular blocky structure; firm; thin nearly continuous clay films; few fine dark concretions (manganese oxide); few pebbles; medium acid; gradual smooth boundary.

2Bt6—49 to 60 inches; strong brown (7.5YR 5/6) clay loam; common fine distinct grayish brown (10YR 5/2), common fine faint strong brown (7.5YR 5/8), and few fine distinct reddish brown (5YR 4/4) mottles; weak medium prismatic structure; firm; thin nearly continuous clay films; common fine dark concretions (manganese oxide); few pebbles; medium acid.

The thickness of the solum ranges from 50 to more than 60 inches. The surface layer is 6 to 9 inches thick.

The Ap horizon has value and chroma of 3 or 4. It is slightly acid to strongly acid. Some pedons have an E horizon. This horizon has value of 4 or 5 and chroma of 2 or 3. It is loam. The Bt horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is very strongly acid to medium acid. The content of clay in this horizon ranges from 35 to 48 percent. The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6.

Klum Series

The Klum series consists of moderately well drained, moderately rapidly permeable soils on flood plains. These soils formed in stratified, loamy alluvium. The native vegetation was mixed grasses and trees. Slopes range from 0 to 5 percent.

Typical pedon of Klum fine sandy loam, 0 to 2 percent slopes, in an area of cropland; 1,500 feet east and 500 feet south of the center of sec. 6, T. 74 N., R. 2 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; weak fine granular structure; friable; neutral; abrupt smooth boundary.

C1—8 to 11 inches; stratified dark brown (10YR 3/3) and dark grayish brown (10YR 4/2) sandy loam; massive; friable; neutral; abrupt irregular boundary.

C2—11 to 14 inches; stratified yellowish brown (10YR 5/4) and dark brown (10YR 3/3) fine sand, sand, and silt loam; single grained; loose; neutral; abrupt irregular boundary.

C3—14 to 24 inches; stratified dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), and pale brown (10YR 6/3) silt loam; appears massive but has weak bedding planes caused by stratification; friable; neutral; abrupt irregular boundary.

C4—24 to 28 inches; brown (10YR 5/3) and yellowish brown (10YR 5/4) sand and coarse sand; single grained; loose; neutral; abrupt irregular boundary.

C5—28 to 47 inches; stratified dark gray (10YR 4/1), grayish brown (10YR 5/2), pale brown (10YR 6/3), light yellowish brown (10YR 6/4), and black (5Y 2/2) silt loam; few fine prominent strong brown (7.5YR 5/8) mottles; massive; friable; thin strata of sandy loam; neutral; clear wavy boundary.

2Ab—47 to 60 inches; very dark gray (5Y 3/1) silty clay loam; weak very fine subangular blocky structure; neutral.

The thickness of the solum is 6 to 10 inches. It corresponds to the thickness of the surface layer.

The A or Ap horizon has value and chroma of 2 or 3. It is neutral to medium acid. The C horizon has value of 3 to 6 and chroma of 2 to 6. It is stratified sand to silt loam.

Koszta Series

The Koszta series consists of somewhat poorly drained, moderately permeable soils on stream terraces.

These soils formed in silty alluvium. The native vegetation was mixed deciduous trees and prairie grasses. Slopes range from 0 to 2 percent.

Typical pedon of Koszta silt loam, 0 to 2 percent slopes, in an area of cropland; 100 feet west and 2,500 feet south of the center of sec. 9, T. 73 N., R. 2 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam (20 percent clay), grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

E—9 to 15 inches; dark grayish brown (10YR 4/2) silt loam (22 percent clay); few very dark grayish brown (10YR 3/2) coatings on faces of peds; weak thin platy structure; friable; few fine roots; medium acid; abrupt smooth boundary.

Bt1—15 to 22 inches; brown (10YR 4/3) silty clay loam (28 percent clay); common fine distinct light olive brown (2.5Y 5/4) mottles; moderate fine angular blocky structure; friable; thin discontinuous clay films; thin nearly continuous silt coatings, light gray (10YR 7/2) dry; few fine roots; medium acid; clear smooth boundary.

Bt2—22 to 30 inches; light brownish gray (2.5Y 6/2) silty clay loam (33 percent clay); common fine distinct yellowish brown (10YR 5/8) and many medium distinct light olive brown (2.5Y 5/4) mottles; moderate fine prismatic structure parting to moderate fine angular blocky; friable; thin nearly continuous clay films; thin discontinuous silt coatings, light gray (10YR 7/2) dry; medium acid; gradual smooth boundary.

Bt3—30 to 40 inches; light brownish gray (2.5Y 6/2) silty clay loam (34 percent clay); common fine distinct yellowish brown (10YR 5/6 and 5/8) and strong brown (7.5YR 4/6) and common medium distinct light olive brown (2.5Y 5/4) mottles; moderate fine angular blocky structure; friable; thin nearly continuous clay films; thin discontinuous silt coatings, light gray (10YR 7/2) dry; many dark concretions (manganese oxide); medium acid; gradual smooth boundary.

Bt4—40 to 48 inches; light brownish gray (2.5Y 6/2) silty clay loam (31 percent clay); common fine distinct strong brown (7.5YR 4/6) and common fine and medium distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium prismatic structure parting to weak medium angular blocky; friable; thin discontinuous clay films; few patchy silt coatings, light gray (10YR 7/2) dry; many dark concretions (manganese oxide); medium acid; gradual smooth boundary.

BC—48 to 55 inches; light brownish gray (2.5Y 6/2) silty clay loam (30 percent clay); many medium prominent yellowish red (5YR 4/6) and common medium distinct strong brown (7.5YR 4/6) and yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to weak medium subangular blocky; friable; thin discontinuous clay films; few dark concretions (manganese oxide); slightly acid; clear smooth boundary.

C—55 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam (28 percent clay); common medium prominent yellowish red (5YR 4/6), common medium distinct yellowish brown (10YR 5/6), and common fine distinct strong brown (7.5YR 4/6) mottles; massive; friable; few dark concretions (manganese oxide); slightly acid.

The thickness of the solum ranges from 36 to 60 inches. The Ap horizon is 6 to 9 inches thick. It has value of 2 or 3 and chroma of 1 or 2. It is medium acid to neutral. The E horizon has value of 4 or 5 and chroma of 2. The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or 3. It is strongly acid or medium acid. The content of clay in this horizon ranges from 28 to 35 percent. The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2.

Ladoga Series

The Ladoga series consists of moderately well drained, moderately slowly permeable soils on convex ridgetops and side slopes in the uplands. These soils formed in loess. The native vegetation was mixed prairie grasses and deciduous trees. Slopes range from 2 to 14 percent.

Typical pedon of Ladoga silt loam, 2 to 5 percent slopes, in an area of cropland; 640 feet west and 65 feet north of the southeast corner of sec. 8, T. 74 N., R. 5 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam (25 percent clay), grayish brown (10YR 5/2) dry; weak fine granular structure; friable; medium acid; abrupt smooth boundary.

E—8 to 11 inches; brown (10YR 4/3) silt loam (25 percent clay); dark brown (10YR 3/3) coatings on faces of peds; weak thin platy structure parting to moderate very fine granular; friable; common fine roots; medium acid; clear smooth boundary.

BE—11 to 14 inches; brown (10YR 4/3) silty clay loam (33 percent clay); moderate very fine subangular blocky structure; friable; very dark grayish brown (10YR 3/2) fillings in old root channels; few fine roots; medium acid; clear wavy boundary.

Bt1—14 to 18 inches; brown (10YR 4/3) silty clay loam (38 percent clay); moderate very fine subangular blocky structure; friable; common patchy silt coatings, very pale brown (10YR 7/3) dry; very thin nearly continuous clay films; common fine roots; medium acid; gradual wavy boundary.

Bt2—18 to 25 inches; dark yellowish brown (10YR 4/4) silty clay loam (38 percent clay); moderate very fine and fine subangular and angular blocky structure;

firm; common patchy silt coatings, very pale brown (10YR 7/3) dry; very thin nearly continuous clay films; common fine roots; few fine dark concretions (manganese oxide); medium acid; gradual wavy boundary.

Bt3—25 to 31 inches; brown (10YR 5/3) silty clay loam (38 percent clay); moderate fine and very fine subangular blocky structure; firm; common patchy silt coatings, very pale brown (10YR 7/3) dry; very thin continuous clay films; common fine roots; few fine dark concretions (manganese oxide); medium acid; gradual wavy boundary.

Bt4—31 to 39 inches; brown (10YR 5/3) silty clay loam (38 percent clay); few fine faint grayish brown (10YR 5/2) and few fine distinct yellowish brown (10YR 5/4 and 5/6) mottles; weak coarse prismatic structure parting to moderate fine subangular blocky; friable; common patchy silt coatings, very pale brown (10YR 7/3) dry; very thin nearly continuous clay films; few fine roots; common fine dark concretions (manganese oxide); medium acid; gradual wavy boundary.

BC—39 to 50 inches; mottled grayish brown (10YR 5/2) and brown (10YR 5/3) silty clay loam (33 percent clay); common fine distinct yellowish brown (10YR 5/4 and 5/6) mottles; weak coarse prismatic structure; friable; very dark gray (10YR 3/1) stains in old root channels; common fine dark concretions (manganese oxide); medium acid; gradual wavy boundary.

C—50 to 60 inches; mottled grayish brown (10YR 5/2), brown (10YR 5/3), and yellowish brown (10YR 5/4) silty clay loam (29 percent clay); few fine faint yellowish brown (10YR 5/6) mottles; massive; friable; common fine dark concretions (manganese oxide); medium acid.

The thickness of the solum ranges from 36 to more than 60 inches. The surface layer is 6 to 9 inches thick.

The A or Ap horizon has value of 2 or 3 and chroma of 1 or 2. The A horizon is neutral to medium acid. The E horizon, if it occurs, has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has value of 4 or 5 and chroma of 2 to 4. Its clay content is 36 to 42 percent. The BC horizon, if it occurs, has value of 5 or 6 and chroma of 2 to 8. The B horizon is strongly acid or medium acid.

Lamont Series

The Lamont series consists of well drained, moderately rapidly permeable soils on ridges and convex side slopes in the uplands and on stream terraces. These soils formed in loamy and sandy eolian material. The native vegetation was deciduous trees. Slopes range from 2 to 5 percent.

Typical pedon of Lamont fine sandy loam, 2 to 5 percent slopes, in an area of cropland; 2,600 feet east and 1,100 feet south of the northwest corner of sec. 22, T. 73 N., R. 2 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) fine sandy loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

E—9 to 15 inches; brown (10YR 4/3) fine sandy loam; dark brown (10YR 3/3) coatings on faces of some peds; weak very fine subangular blocky structure; friable; thin nearly continuous silt coatings, light gray (10YR 7/2) dry; few fine roots; medium acid; clear smooth boundary.

Bt1—15 to 27 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine subangular blocky structure; very friable; thin discontinuous clay films; thin patchy silt coatings, light gray (10YR 7/2) dry; medium acid; clear smooth boundary.

Bt2—27 to 37 inches; brown (7.5YR 4/4) fine sandy loam; dark yellowish brown (10YR 4/4) coatings on faces of peds; weak fine and medium subangular blocky structure; very friable; thin discontinuous clay films; thin patchy silt coatings, light gray (10YR 7/2) dry; strongly acid; gradual smooth boundary.

Bt3—37 to 47 inches; brown (7.5YR 4/4) fine sandy loam; dark yellowish brown (10YR 4/4) coatings on faces of peds; weak medium subangular blocky structure; very friable; few thin discontinuous clay films; medium acid; gradual smooth boundary.

Bt4—47 to 60 inches; brown (7.5YR 4/4) fine sandy loam; brown (10YR 4/3) coatings on faces of peds; weak medium subangular blocky structure; very friable; thin discontinuous clay films; medium acid.

The thickness of the solum ranges from 30 to more than 60 inches. The surface layer is 6 to 9 inches thick.

The A or Ap horizon is neutral to medium acid. It has value of 3 or 4 and chroma of 2 or 3. Value is 3 only in pedons where the surface layer is less than 3 inches thick or where it has value of 6 or more when dry. The E horizon, if it occurs, has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It generally is fine sandy loam, but the range includes sandy loam and sandy clay loam. This horizon is strongly acid to slightly acid.

Lawson Series

The Lawson series consists of somewhat poorly drained, moderately permeable soils on flood plains along rivers and the major streams. These soils formed in silty alluvium. The native vegetation was prairie grasses. Slopes range from 0 to 2 percent.

Typical pedon of Lawson silt loam, 0 to 2 percent slopes, in an area of cropland; 325 feet west and 2,100 feet south of the northeast corner of sec. 29, T. 76 N., R. 5 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.
A1—8 to 15 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; few fine roots; neutral; diffuse smooth boundary.
A2—15 to 24 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; few fine roots; neutral; diffuse smooth boundary.
A3—24 to 35 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; neutral; clear smooth boundary.
C1—35 to 48 inches; very dark grayish brown (10YR 3/2) silty clay loam stratified with thin lenses of grayish brown (10YR 5/2) silt loam; massive; friable; neutral; clear smooth boundary.
C2—48 to 60 inches; very dark gray (10YR 3/1) silty clay loam; massive; friable; neutral.

The A horizon ranges from 24 to 36 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. The C horizon has value of 3 to 6 and chroma of 1 to 3. It is silt loam or silty clay loam.

Lindley Series

The Lindley series consists of well drained, moderately slowly permeable soils on convex side slopes in the uplands. These soils formed in glacial till. The native vegetation was deciduous trees. Slopes range from 9 to 40 percent.

Typical pedon of Lindley loam, 14 to 18 percent slopes, in an area of woodland; 1,000 feet north and 1,500 feet east of the center of sec. 23, T. 73 N., R. 4 W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.
E1—4 to 7 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; moderate medium platy structure; friable; few fine roots; few fine pores; slightly acid; clear smooth boundary.
E2—7 to 9 inches; brown (10YR 5/3) loam, light brownish gray (10YR 6/2) dry; dark grayish brown (10YR 4/2) coatings on faces of some plates; moderate medium platy structure; friable; few fine roots; few fine pores; slightly acid; abrupt smooth boundary.
BE—9 to 12 inches; yellowish brown (10YR 5/4) loam; dark yellowish brown (10YR 4/4) coatings on faces of peds; weak fine and medium subangular blocky structure; friable; many sand and silt coatings, very pale brown (10YR 7/3) dry; few fine roots; few fine pores; few pebbles; strongly acid; clear smooth boundary.
Bt1—12 to 18 inches; yellowish brown (10YR 5/6) loam; yellowish brown (10YR 5/4) coatings on faces of peds; few fine distinct strong brown (7.5YR 5/6 and 5/8) mottles; weak fine and medium subangular blocky structure; friable; thin discontinuous clay films; few fine pores; few fine roots; few pebbles; strongly acid; clear smooth boundary.
Bt2—18 to 26 inches; yellowish brown (10YR 5/6) clay loam; few fine faint grayish brown (10YR 5/2) and common fine distinct strong brown (7.5YR 5/6) mottles; moderate medium and fine subangular blocky structure; firm; thin nearly continuous clay films; few pebbles; strongly acid; clear smooth boundary.
Bt3—26 to 38 inches; yellowish brown (10YR 5/6) clay loam; few fine distinct light brownish gray (10YR 6/2) and many fine distinct strong brown (7.5YR 5/6 and 5/8) mottles; moderate medium subangular blocky structure; firm; thin continuous clay films; few fine dark concretions (manganese oxide); few pebbles; strongly acid; clear smooth boundary.
Bt4—38 to 50 inches; strong brown (7.5YR 5/6) clay loam; common fine faint strong brown (7.5YR 5/8), common fine distinct yellowish brown (10YR 5/4), and few fine distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; thin continuous clay films; few fine dark concretions (manganese oxide); few pebbles; strongly acid; clear smooth boundary.
C1—50 to 54 inches; grayish brown (10YR 5/2) loam; common medium distinct strong brown (7.5YR 5/6 and 5/8) mottles; massive; firm; few fine dark concretions (manganese oxide); few pebbles; neutral; clear smooth boundary.
C2—54 to 60 inches; mottled strong brown (7.5YR 5/6 and 5/8) and grayish brown (10YR 5/2) loam; massive; firm; few pebbles; neutral.

The thickness of the solum ranges from 36 to 60 inches. The surface layer is 2 to 5 inches thick. The E horizon is 0 to 7 inches thick.

The A horizon has value of 3 or 4 and chroma of 1 or 2. It is neutral to medium acid. The Ap horizon has value of 4 or 5 and chroma of 2 to 5. The E horizon, if it occurs, has value of 4 to 6 and chroma of 2 to 4. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is strongly acid to slightly acid. It typically is clay loam, but the range includes loam. The content of clay in the upper 20 inches of the argillic horizon is 27 to 35 percent. The C horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 2 to 8.

Mahaska Series

The Mahaska series consists of somewhat poorly drained, moderately permeable soils on the tops of ridges in the uplands. These soils formed in loess. The native vegetation was prairie grasses. Slopes range from 0 to 5 percent.

Typical pedon of Mahaska silty clay loam, 0 to 2 percent slopes, in an area of cropland; 160 feet north and 80 feet east of the southwest corner of sec. 32, T. 73 N., R. 4 W.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam (29 percent clay), dark gray (10YR 4/1) dry; weak fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

A—8 to 14 inches; very dark gray (10YR 3/1) silty clay loam (29 percent clay), dark gray (10YR 4/1) dry; weak fine granular structure; friable; few fine roots; few fine pores; neutral; clear smooth boundary.

AB—14 to 19 inches; very dark grayish brown (10YR 3/2) silty clay loam (29 percent clay), gray (10YR 5/1) dry; very dark gray (10YR 3/1) coatings on faces of peds; weak very fine and fine subangular blocky structure; friable; few fine roots; few fine pores; slightly acid; clear smooth boundary.

Bt—19 to 24 inches; dark grayish brown (2.5Y 4/2) silty clay loam (38 percent clay); many very dark grayish brown (10YR 3/2) coatings on faces of peds; few fine faint olive brown (2.5Y 4/4) mottles; dark grayish brown (2.5Y 4/2) kneaded; moderate very fine and fine subangular blocky structure; firm; thin nearly continuous clay films; few fine roots; few fine pores; medium acid; gradual smooth boundary.

Btg1—24 to 30 inches; dark grayish brown (2.5Y 4/2) silty clay loam (38 percent clay); many very dark grayish brown (10YR 3/2) coatings on faces of peds; common fine faint light olive brown (2.5Y 5/4), common fine distinct light olive brown (2.5Y 5/6), and few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; thin nearly continuous clay films; few fine roots; few fine pores; medium acid; gradual smooth boundary.

Btg2—30 to 35 inches; grayish brown (2.5Y 5/2) silty clay loam (38 percent clay); few very dark grayish brown (10YR 3/2) coatings on faces of peds; common fine distinct yellowish brown (10YR 5/6), common fine faint light olive brown (2.5Y 5/4), and few fine distinct strong brown (7.5YR 4/6) mottles; weak medium subangular blocky structure parting to weak fine subangular blocky; friable; thin discontinuous clay films; few fine roots; few fine pores; medium acid; gradual smooth boundary.

Btg3—35 to 41 inches; grayish brown (2.5Y 5/2) silty clay loam (33 percent clay); common fine distinct yellowish brown (10YR 5/6) and common fine faint light olive brown (2.5Y 5/4) mottles; weak medium subangular blocky structure; friable; few very thin patchy clay films; few fine roots; few fine pores; few very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) organic fillings in old root channels; few fine dark concretions (manganese oxide); slightly acid; gradual smooth boundary.

Btg4—41 to 47 inches; grayish brown (2.5Y 5/2) silty clay loam (33 percent clay); few fine faint light olive brown (2.5Y 5/4) and common fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak medium subangular blocky structure; friable; thin discontinuous clay films; few fine roots; few fine pores; few very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) organic fillings in old root channels; few fine dark concretions (manganese oxide); slightly acid; gradual smooth boundary.

BCg—47 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam (29 percent clay); common medium distinct yellowish brown (10YR 5/6) and common medium faint light olive brown (2.5Y 5/4) mottles; weak medium prismatic structure; friable; few fine pores; few fine dark concretions (manganese oxide); slightly acid.

The thickness of the solum ranges from 48 to more than 60 inches. The thickness of the mollic epipedon ranges from 12 to 24 inches.

The A horizon has value of 2 and 3 and chroma of 1 or 2. The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2. It is strongly acid to slightly acid. The content of clay is 36 to 42 percent in the finest textured part of this horizon.

Marshan Series

The Marshan series consists of poorly drained, moderately permeable soils on stream terraces. These soils formed in loamy and sandy alluvium. The native vegetation was prairie grasses. Slopes range from 0 to 2 percent.

Typical pedon of Marshan clay loam, 0 to 2 percent slopes, in an area of cropland; 378 feet west and 2,574 feet north of the southeast corner of sec. 21, T. 75 N., R. 4 W.

Ap—0 to 8 inches; black (N 2/0) clay loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

A—8 to 17 inches; black (10YR 2/1) clay loam, dark gray (10YR 4/1) dry; black (N 2/0) coatings on faces of some peds; weak fine granular structure; friable; few fine roots; slightly acid; gradual smooth boundary.

AB—17 to 23 inches; very dark gray (10YR 3/1) clay loam, gray (10YR 5/1) dry; black (10YR 2/1) coatings on faces of peds; common fine distinct

olive gray (5Y 4/2) mottles; weak fine granular structure; friable; few fine roots; slightly acid; clear smooth boundary.

Bg1—23 to 30 inches; olive gray (5Y 4/2) clay loam; very dark gray (10YR 3/1) and dark gray (10YR 4/1) coatings on faces of some peds; few fine distinct yellowish brown (10YR 5/8) and common fine distinct light olive brown (2.5Y 5/6) mottles; weak fine subangular blocky structure; friable; few fine roots; slightly acid; gradual smooth boundary.

Bg2—30 to 37 inches; olive gray (5Y 4/2) clay loam; dark gray (10YR 4/1) coatings on faces of some peds; common fine faint olive gray (5Y 5/2) and common fine distinct light olive brown (2.5Y 5/6) mottles; weak fine and medium subangular blocky structure; friable; few fine roots; black (10YR 2/1) krotovina 2 inches in diameter; slightly acid; clear smooth boundary.

2Bg3—37 to 44 inches; olive gray (5Y 4/2) fine sandy loam; dark gray (10YR 4/1) coatings on faces of some peds; common fine prominent strong brown (7.5YR 5/8) and common fine distinct light olive brown (2.5Y 5/6) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; few fine roots; black (10YR 2/1) krotovina 2 inches in diameter; slightly acid; abrupt smooth boundary.

2Cg—44 to 60 inches; light olive gray (5Y 6/2) loamy sand; common fine distinct light olive brown (2.5Y 5/6) mottles; single grained; loose; slightly acid.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 14 to 24 inches.

The A horizon has value of 2 or 3 and chroma of 0 or 1. It is neutral to medium acid. The B horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is loam, clay loam, or fine sandy loam. It is slightly acid to strongly acid. The 2C horizon has colors similar to those of the B horizon.

Muscatine Series

The Muscatine series consists of somewhat poorly drained, moderately permeable soils on the tops of ridges in the uplands. These soils formed in loess. The native vegetation was prairie grasses. Slopes range from 0 to 2 percent.

Typical pedon of Muscatine silty clay loam, 0 to 2 percent slopes, in an area of cropland; 600 feet east and 150 feet north of the southwest corner of sec. 9, T. 75 N., R. 3 W.

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam (28 percent clay), gray (10YR 5/1) dry; weak fine granular structure; friable; common very fine roots; neutral; abrupt smooth boundary.

A1—7 to 11 inches; very dark gray (10YR 3/1) silty clay loam (29 percent clay), gray (10YR 5/1) dry; weak fine granular structure; friable; few very fine roots; slightly acid; clear smooth boundary.

A2—11 to 15 inches; very dark grayish brown (10YR 3/2) silty clay loam (30 percent clay), grayish brown (10YR 5/2) dry; mixed with some dark grayish brown (2.5Y 4/2) material in the lower part; weak fine granular structure; friable; few very fine roots; slightly acid; clear smooth boundary.

Btg1—15 to 22 inches; dark grayish brown (2.5Y 4/2) silty clay loam (32 percent clay); very dark grayish brown (2.5Y 3/2) coatings on faces of peds; common fine faint olive brown (2.5Y 4/4) mottles; moderate fine and very fine subangular blocky structure; friable; thin discontinuous clay films; few thin discontinuous silt coatings on faces of peds, light gray (10YR 7/2) dry; few very fine roots; medium acid; clear smooth boundary.

Btg2—22 to 29 inches; grayish brown (2.5Y 5/2) silty clay loam (35 percent clay); dark grayish brown (2.5Y 4/2) coatings on faces of peds; common fine distinct light olive brown (2.5Y 5/4 and 5/6) mottles; moderate fine and very fine subangular blocky structure; friable; thin nearly continuous clay films on faces of peds; few discontinuous silt coatings on faces of peds, light gray (10YR 7/2) dry; few very fine roots; few fine dark concretions (manganese oxide); medium acid; clear smooth boundary.

Btg3—29 to 38 inches; grayish brown (2.5Y 5/2) silty clay loam (35 percent clay); dark grayish brown (2.5Y 4/2) coatings on faces of peds; common fine distinct light olive brown (2.5Y 5/4 and 5/6) mottles; weak fine prismatic structure parting to weak fine and medium subangular blocky; friable; thin discontinuous clay films; few very fine roots; few fine dark concretions (manganese oxide); slightly acid; gradual smooth boundary.

Btg4—38 to 46 inches; grayish brown (2.5Y 5/2) silty clay loam (34 percent clay); dark grayish brown (2.5Y 4/2) coatings on faces of some peds; common fine distinct light olive brown (2.5Y 5/4 and 5/6) mottles; weak fine prismatic structure parting to weak medium subangular blocky; friable; thin discontinuous clay films on faces of peds; common fine dark concretions (manganese oxide); slightly acid; clear smooth boundary.

BCg—46 to 51 inches; grayish brown (2.5Y 5/2) silty clay loam (31 percent clay); few fine distinct yellowish brown (10YR 5/6) and common fine distinct light olive brown (2.5Y 5/4 and 5/6) mottles; weak medium prismatic structure; friable; common fine concretions (manganese oxide); neutral; clear smooth boundary.

Cg—51 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam (29 percent clay); common fine faint light olive brown (2.5Y 5/4) and common medium distinct light

olive brown (2.5Y 5/6) mottles; massive; friable; common fine dark concretions (manganese oxide); neutral.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 10 to 20 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The A and B horizons are neutral to medium acid. The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. The content of clay is 27 to 35 percent in the finest textured part of this horizon. The C horizon has value of 5 or 6 and chroma of 2 and has mottles with higher chroma.

Nira Series

The Nira series consists of moderately well drained, moderately permeable soils on convex ridgetops, in coves at the head of drainageways, and on short, convex or plane side slopes surrounding nearly level upland divides. These soils formed in loess. The native vegetation was prairie grasses. Slopes range from 2 to 9 percent.

Typical pedon of Nira silty clay loam, 2 to 5 percent slopes, in an area of cropland; 1,750 feet north and 50 feet east of the southwest corner of sec. 31, T. 73 N., R. 3 W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay loam (29 percent clay), gray (10YR 5/1) dry; weak fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

A1—7 to 12 inches; very dark gray (10YR 3/1) silty clay loam (33 percent clay), gray (10YR 5/1) dry; weak very fine subangular blocky structure; friable; few fine roots; slightly acid; clear smooth boundary.

Bw1—12 to 21 inches; brown (10YR 4/3) silty clay loam (33 percent clay); some very dark grayish brown (10YR 3/2) coatings on faces of peds; few fine faint yellowish brown (10YR 5/6) mottles; moderate very fine subangular blocky structure; friable; few fine roots; medium acid; gradual smooth boundary.

Bw2—21 to 29 inches; grayish brown (2.5Y 5/2) silty clay loam (33 percent clay); few fine distinct strong brown (7.5YR 5/6) and many fine distinct light olive brown (2.5Y 5/4) mottles; moderate very fine and fine subangular blocky structure; friable; few fine roots; medium acid; gradual smooth boundary.

Bw3—29 to 36 inches; grayish brown (2.5Y 5/2) silty clay loam (33 percent clay); dark grayish brown (2.5Y 4/2) coatings on faces of peds; common fine distinct light olive brown (2.5Y 5/4 and 5/6) and yellowish brown (10YR 5/8) mottles; moderate fine subangular blocky structure; friable; few fine roots; few dark concretions (manganese oxide); medium acid; gradual smooth boundary.

Bw4—36 to 48 inches; olive gray (5Y 5/2) silty clay loam (29 percent clay); few dark grayish brown (2.5Y 4/2) coatings on faces of peds; common fine distinct yellowish brown (10YR 5/8), common coarse prominent strong brown (7.5YR 5/6), and common fine prominent strong brown (7.5YR 5/4) mottles; weak fine prismatic structure parting to weak medium subangular blocky; friable; few fine roots; many dark concretions (manganese oxide); medium acid; gradual smooth boundary.

C—48 to 60 inches; light olive gray (5Y 6/2) silty clay loam (29 percent clay); common fine distinct yellowish brown (10YR 5/8) and common coarse prominent strong brown (7.5YR 5/6) mottles; massive; friable; many dark concretions (manganese oxide); slightly acid.

The thickness of the solum ranges from 30 to 50 inches. The thickness of the mollic epipedon ranges from 10 to 15 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The upper part of the Bt or Bw horizon has value of 4 and chroma of 2 to 4. The lower part of the Bt horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 or 6, and chroma of 1 or 2. The Bt horizon is medium acid or strongly acid. The content of clay in the upper 20 inches of the B horizon is 28 to 35 percent. The C horizon has hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 1 or 2.

Nodaway Series

The Nodaway series consists of moderately well drained, moderately permeable soils on flood plains along rivers and the major streams. These soils formed in stratified, silty and loamy alluvium. The native vegetation was prairie grasses. Slopes range from 0 to 5 percent.

Typical pedon of Nodaway silt loam, 0 to 2 percent slopes, in an area of cropland; 219 feet east and 1,960 feet north of the southwest corner of sec. 19, T. 76 N., R. 5 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; weak fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

C—7 to 60 inches; stratified very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), brown (10YR 4/3), and light brownish gray (10YR 6/2) silt loam; appears massive but has distinct horizontal bedding planes; friable; few fine roots; neutral.

The A or Ap horizon is 6 to 9 inches thick. It has chroma of 1 or 2. It is neutral or slightly acid. The C horizon also is neutral or slightly acid. It has value of 3 to 6 and chroma of 1 to 4. It is dominantly silt loam but has

thin strata of silty clay loam, fine sandy loam, and loam. The size of the sand is fine or very fine.

Nordness Series

The Nordness series consists of shallow, well drained, moderately permeable soils on side slopes and escarpments in the uplands. These soils formed in loamy material over limestone bedrock. The native vegetation was deciduous trees. Slopes range from 18 to 40 percent.

Typical pedon of Nordness silt loam, 18 to 40 percent slopes, in an area of woodland; 420 feet west and 1,280 feet south of the northeast corner of sec. 4, T. 74 N., R. 4 W.

A—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak very fine granular structure; friable; many fine roots; neutral; clear smooth boundary.
E—5 to 9 inches; brown (10YR 5/3) silt loam; weak very thin platy structure parting to moderate very fine granular; friable; common fine roots; neutral; clear smooth boundary.
BE—9 to 11 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; thin discontinuous clay films; few fine roots; few silt coatings, pale brown (10YR 6/3) dry; slightly acid; abrupt smooth boundary.
Bt1—11 to 15 inches; brown (10YR 4/3) silty clay loam; moderate very fine and fine subangular blocky structure; friable; thin nearly continuous clay films; few silt coatings, pale brown (10YR 6/3) dry; thin nearly continuous clay films; common fine roots; slightly acid; clear smooth boundary.
2Bt2—15 to 17 inches; brown (7.5YR 4/4) silty clay loam; weak fine subangular blocky structure; friable; thin continuous clay films; many small pebbles; few fine roots; slightly acid; abrupt smooth boundary.
2R—17 inches; hard fractured limestone bedrock.

The solum ranges from 9 to 20 inches in thickness. It is medium acid to neutral. The A horizon is 1 to 5 inches thick. It has value of 3 or 4 and chroma of 1 or 2. It generally is silt loam, but the range includes loam. The Bt and 2Bt horizons have value of 3 to 5 and chroma of 3 to 6. They are loam, clay, silty clay loam, or clay loam.

Olmitz Series

The Olmitz series consists of moderately well drained, moderately permeable soils on alluvial fans and foot slopes. These soils formed in loamy local alluvium derived from glacial till. The native vegetation was prairie grasses. Slopes range from 2 to 9 percent.

Typical pedon of Olmitz loam, 5 to 9 percent slopes, in a pasture; 1,050 feet south and 300 feet west of the northeast corner of sec. 11, T. 75 N., R. 3 W.

A1—0 to 10 inches; dark brown (10YR 3/3) loam, grayish brown (10YR 5/2) dry; very dark grayish brown (10YR 3/2) coatings on faces of peds; moderate very fine granular structure; friable; neutral; clear wavy boundary.
A2—10 to 23 inches; very dark grayish brown (10YR 3/2) clay loam, dark grayish brown (10YR 4/2) dry; very dark gray (10YR 3/1) coatings on faces of peds; moderate fine granular structure; friable; neutral; clear wavy boundary.
AB—23 to 32 inches; very dark grayish brown (10YR 3/2) clay loam, brown (10YR 5/3) dry; moderate very fine granular structure; friable; neutral; clear wavy boundary.
Bw1—32 to 40 inches; dark brown (10YR 3/3) clay loam, brown (10YR 5/3) dry; few fine faint brown (10YR 5/3) mottles; moderate fine granular structure; friable; neutral; clear wavy boundary.
Bw2—40 to 49 inches; brown (10YR 4/3) clay loam, brown (10YR 5/3) dry; few fine faint brown (10YR 5/3) mottles; moderate fine granular structure; friable; neutral; clear wavy boundary.
Bw3—49 to 56 inches; dark brown (10YR 3/3) and brown (10YR 4/3) clay loam, brown (10YR 5/3) dry; moderate fine granular structure; friable; neutral; clear wavy boundary.
Bw4—56 to 60 inches; very dark grayish brown (10YR 3/2) clay loam, dark grayish brown (10YR 4/2) dry; moderate very fine granular structure; friable; neutral.

The thickness of the solum ranges from 50 to more than 60 inches. The thickness of the mollic epipedon ranges from 24 to 42 inches.

The A horizon has value of 3 and chroma of 2 or 3. The A and Bw horizons are slightly acid or neutral. The Bw horizon has value of 3 or 4 and chroma of 2 to 4.

Otley Series

The Otley series consists of moderately well drained, moderately permeable soils on convex ridgetops and side slopes in the uplands. These soils formed in loess. The native vegetation was prairie grasses. Slopes range from 2 to 9 percent.

Typical pedon of Otley silty clay loam, 2 to 5 percent slopes, in an area of cropland; 2,200 feet north and 25 feet west of the center of sec. 28, T. 74 N., R. 5 W.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam (29 percent clay), dark grayish brown (10YR 4/2) dry; weak fine and very fine granular structure; friable; few fine roots; slightly acid; clear smooth boundary.
A1—8 to 14 inches; very dark brown (10YR 2/2) silty clay loam (29 percent clay), very dark grayish brown (10YR 3/2) kneaded; weak fine and very fine

granular structure; friable; very few fine roots; slightly acid; clear smooth boundary.

A2—14 to 18 inches; very dark grayish brown (10YR 3/2) silty clay loam (29 percent clay); weak fine and very fine granular structure; friable; slightly acid; clear smooth boundary.

Bt1—18 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam (38 percent clay); very dark grayish brown (10YR 3/2) coatings on faces of peds; weak fine and very fine subangular blocky structure; firm; thin patchy clay films; medium acid; clear smooth boundary.

Bt2—24 to 28 inches; dark yellowish brown (10YR 4/4) silty clay loam (38 percent clay); few dark brown (10YR 3/3) coatings on faces of peds; few fine faint grayish brown (10YR 5/2) mottles; weak very fine subangular blocky structure; firm; thin discontinuous clay films; very few fine dark concretions (manganese oxide); medium acid; clear smooth boundary.

Bt3—28 to 34 inches; yellowish brown silty clay loam (38 percent clay); few brown (10YR 4/3) coatings on faces of peds; few fine faint yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) and few fine distinct dark brown (7.5YR 3/4) mottles; weak very fine angular blocky structure; friable; thin discontinuous clay films; very few fine dark concretions (manganese oxide); medium acid; clear smooth boundary.

Bt4—34 to 39 inches; yellowish brown (10YR 5/4) silty clay loam (38 percent clay); few brown (10YR 4/3) coatings on faces of peds; few fine faint dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/6), and light brownish gray (10YR 6/2) mottles; weak medium prismatic structure parting to weak fine angular blocky; friable; thin discontinuous clay films; very few fine dark concretions (manganese oxide); slightly acid; clear smooth boundary.

Bt5—39 to 48 inches; yellowish brown (10YR 5/4) silty clay loam (33 percent clay); brown (10YR 4/3) coatings on faces of a few peds; few fine faint yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) mottles; weak medium and coarse prismatic structure parting to weak medium and fine subangular blocky; friable; few fine dark concretions (manganese oxide); slightly acid; clear smooth boundary.

BC—48 to 60 inches; yellowish brown (10YR 5/4) silty clay loam (33 percent clay); few fine faint yellowish brown (10YR 5/6) and common fine faint light brownish gray (10YR 6/2) mottles; weak medium and coarse prismatic structure; friable; few fine dark concretions (manganese oxide); slightly acid.

The thickness of the solum ranges from 48 to more than 60 inches. The thickness of the mollic epipedon ranges from 10 to 20 inches.

The A horizon has value of 2 or 3 and chroma of 1 to 3. It is neutral to medium acid. The Bt horizon is strongly acid to slightly acid. The upper part of this horizon has value of 4 or 5 and chroma of 3 or 4. The lower part of the Bt horizon and the BC horizon have hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. The content of clay is 36 to 42 percent in the finest textured part of the B horizon.

Perks Series

The Perks series consists of excessively drained, rapidly permeable soils on flood plains. These soils formed in sandy alluvium. The native vegetation was deciduous trees. Slopes range from 0 to 3 percent.

Typical pedon of Perks loamy sand, 0 to 3 percent slopes, in an area of cropland; 1,450 feet east and 150 feet north of the southwest corner of sec. 17, T. 73 N., R. 2 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loamy sand, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; few fine roots; medium acid; abrupt smooth boundary.

C1—9 to 21 inches; yellowish brown (10YR 5/4) sand; single grained; loose; medium acid; gradual smooth boundary.

C2—21 to 60 inches; light yellowish brown (10YR 6/4) sand; single grained; loose; few 1-inch strata of fine sand; slightly acid.

The A or Ap horizon is less than 10 inches thick. It has value of 3 and chroma of 2 or 3. It is sandy loam or loamy sand. It is medium acid to neutral. The C horizon has value and chroma of 4 to 6. It is sand to loamy sand.

Rinda Series

The Rinda series consists of poorly drained, very slowly permeable soils on short, convex to plane side slopes and in coves at the upper end of drainageways in the uplands. These soils formed in silty sediments and in the underlying clayey glacial till. The native vegetation was mixed prairie grasses and deciduous trees. Slopes range from 5 to 14 percent.

Typical pedon of Rinda silty clay loam, 9 to 14 percent slopes, moderately eroded, in a pasture; 550 feet east and 360 feet south of the northwest corner of sec. 18, T. 74 N., R. 5 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; mixed with streaks and pockets of brown (10YR 5/3) silty clay loam subsoil material; weak fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

Bw—8 to 12 inches; brown (10YR 5/3) silty clay loam; few fine faint dark grayish brown (2.5Y 4/2), common fine distinct dark yellowish brown (10YR 3/4), and few fine distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; common fine roots; some very dark grayish brown (10YR 3/2) fillings in old root channels; strongly acid; clear smooth boundary.

Bg—12 to 15 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/4) and few fine distinct strong brown (7.5YR 5/6) mottles; moderate fine subangular blocky structure; friable; common fine roots; few fine dark concretions (manganese oxide); strongly acid; clear wavy boundary.

2Btg1—15 to 28 inches; grayish brown (2.5Y 5/2) clay; common fine distinct brown (7.5YR 4/4) mottles; moderate very fine subangular blocky structure; firm; thin continuous clay films; few fine roots; very dark gray (10YR 3/1) coatings on vertical faces of peds; slightly acid; gradual smooth boundary.

2Btg2—28 to 40 inches; grayish brown (2.5Y 5/2) clay; moderate fine subangular blocky structure; firm; thin continuous clay films; few fine roots; few very dark gray (10YR 3/1) stains on vertical faces of peds; few fine dark concretions (manganese oxide); slightly acid; gradual smooth boundary.

2Btg3—40 to 52 inches; gray (5Y 5/1) clay; few fine distinct dark yellowish brown (10YR 4/4) mottles; weak fine subangular blocky structure; firm; thin continuous clay films; medium acid; gradual smooth boundary.

2Btg4—52 to 60 inches; gray (5Y 5/1) clay; few fine prominent strong brown (7.5YR 4/6) mottles; weak medium subangular blocky structure; firm; thin continuous clay films; slightly acid.

The thickness of the solum ranges from 48 to more than 60 inches. The surface layer is 6 to 9 inches thick.

The A or Ap horizon has value of 3 and chroma of 1 or 2. The A horizon is neutral to medium acid. The E horizon, if it occurs, has value of 4 or 5 and chroma of 2 or 3. It is silt loam or silty clay loam. The 2Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is silty clay or clay. It ranges from neutral to strongly acid.

Rowley Series

The Rowley series consists of somewhat poorly drained, moderately permeable soils on stream terraces. These soils formed in silty alluvium. The native vegetation was prairie grasses. Slopes range from 0 to 2 percent.

These soils are taxadjuncts because they do not have an argillic horizon, which is definitive for the Rowley series.

Typical pedon of Rowley silt loam, 0 to 2 percent slopes, in an area of cropland; 428 feet west and 300 feet north of the center of sec. 6, T. 73 N., R. 3 W.

Ap—0 to 8 inches; black (10YR 2/1) silt loam (24 percent clay), dark gray (10YR 4/1) dry; weak fine granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

A—8 to 17 inches; very dark gray (10YR 3/1) silt loam (25 percent clay), dark gray (10YR 4/1) dry; black (10YR 2/1) coatings on faces of peds; weak fine granular structure; friable; few fine roots; medium acid; gradual smooth boundary.

AB—17 to 23 inches; very dark grayish brown (10YR 3/2) silt loam (24 percent clay), grayish brown (10YR 5/2) dry; very dark gray (10YR 3/1) coatings on faces of peds; weak fine granular structure; friable; few fine roots; medium acid; clear smooth boundary.

BA—23 to 29 inches; dark grayish brown (10YR 4/2) silt loam (22 percent clay); very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) coatings on faces of peds; very dark grayish brown (10YR 3/2) kneaded; few fine distinct yellowish brown (10YR 5/8) and common fine distinct yellowish brown (10YR 5/4) mottles; weak fine and very fine subangular blocky structure; friable; few fine roots; medium acid; clear smooth boundary.

Bt1—29 to 37 inches; grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) silt loam (21 percent clay); dark grayish brown (10YR 4/2) coatings on faces of peds; many fine distinct yellowish brown (10YR 5/8) and common fine distinct strong brown (7.5YR 4/6) mottles; weak fine subangular blocky structure; friable; few thin discontinuous clay films; few dark concretions (manganese oxide); medium acid; clear smooth boundary.

Bt2—37 to 44 inches; grayish brown (2.5Y 5/2) silt loam (26 percent clay); many fine distinct yellowish brown (10YR 5/8) and light olive brown (2.5Y 5/6) mottles; weak fine prismatic structure parting to weak fine subangular blocky; friable; few thin discontinuous clay films; few dark concretions (manganese oxide); medium acid; clear smooth boundary.

Bt3—44 to 54 inches; grayish brown (2.5Y 5/2) silty clay loam (36 percent clay); many fine and medium distinct light olive brown (2.5Y 5/6), few fine distinct strong brown (7.5YR 4/6), and common fine distinct yellowish brown (10YR 5/8) mottles; weak fine prismatic structure parting to weak medium subangular blocky; friable; few thin patchy clay films; few very dark gray (10YR 3/1) fillings in root channels; few dark concretions (manganese oxide); medium acid; gradual smooth boundary.

BC—54 to 60 inches; olive gray (5Y 5/2) silty clay loam (38 percent clay); many fine distinct light olive brown (2.5Y 5/6), common fine distinct yellowish brown

(10YR 5/6), and few fine prominent strong brown (7.5YR 4/6) mottles; weak fine prismatic structure parting to weak medium subangular blocky; friable; few thin discontinuous clay films; few dark concretions (manganese oxide); medium acid.

The thickness of the solum ranges from 36 to more than 60 inches. The thickness of the mollic epipedon ranges from 12 to 24 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is neutral to medium acid. The B horizon also is neutral to medium acid. It has value of 4 or 5 and chroma of 2 or 3. The content of clay in the upper part of the Bt horizon is 20 and 30 percent. The C horizon, if it occurs, has colors similar to those of the B horizon.

Rubio Series

The Rubio series consists of poorly drained, slowly permeable soils on broad upland divides. These soils formed in loess. The native vegetation was mixed prairie grasses and deciduous trees. Slopes range from 0 to 2 percent.

Typical pedon of Rubio silt loam, 0 to 2 percent slopes, in an area of cropland; 800 feet south and 2,200 feet west of the northeast corner of sec. 14, T. 74 N., R. 5 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam (21 percent clay), grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine roots; neutral; abrupt smooth boundary.

E—9 to 15 inches; dark grayish brown (10YR 4/2) silt loam (21 percent clay), grayish brown (10YR 5/2) dry; common fine distinct grayish brown (2.5Y 5/2) mottles; weak thin platy structure; friable; few very fine roots; medium acid; abrupt smooth boundary.

BE—15 to 21 inches; dark grayish brown (10YR 4/2) silty clay loam (33 percent clay); common fine distinct grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/4) mottles; weak fine subangular blocky structure; friable; thin nearly continuous clay films; many prominent silt coatings, light gray (10YR 7/2) dry; few very fine roots; strongly acid; clear smooth boundary.

Btg1—21 to 27 inches; grayish brown (2.5Y 5/2) silty clay loam (38 percent clay); common fine prominent yellowish brown (10YR 5/8) and common fine distinct light yellowish brown (2.5Y 6/4) mottles; moderate fine angular blocky structure; firm; thin continuous clay films; common prominent silt coatings, light gray (10YR 7/2) dry; few very fine roots; few very fine dark concretions (manganese oxide); strongly acid; gradual smooth boundary.

Btg2—27 to 33 inches; grayish brown (2.5Y 5/2) silty clay loam (38 percent clay); common fine prominent strong brown (7.5YR 4/6) and common fine prominent light yellowish brown (2.5Y 6/4) and yellowish brown (10YR 5/6 and 5/8) mottles; moderate fine and medium angular blocky structure; firm; thin continuous clay films; few prominent silt coatings, light gray (10YR 7/2) dry; few very fine roots; common very fine dark concretions (manganese oxide); few black (10YR 2/1) organic stains about 5 millimeters in diameter; strongly acid; gradual smooth boundary.

Btg3—33 to 39 inches; grayish brown (2.5Y 5/2) silty clay loam (38 percent clay); common fine distinct light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; firm; thick continuous clay films; few very fine roots; common very fine dark concretions (manganese oxide); few black (10YR 2/1) organic stains; strongly acid; clear smooth boundary.

Btg4—39 to 47 inches; light brownish gray (2.5Y 6/2) silty clay loam (33 percent clay); common fine distinct light olive brown (2.5Y 5/6) and strong brown (7.5YR 5/6) mottles; weak medium prismatic structure; friable; thin continuous clay films; common very fine dark concretions (manganese oxide); few black (10YR 2/1) organic stains; medium acid; gradual smooth boundary.

BCg—47 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam (33 percent clay); common fine distinct light olive brown (2.5Y 5/6) and common fine prominent dark reddish brown (5YR 3/3) mottles; weak medium prismatic structure; friable; thin discontinuous clay films; few reddish brown (5YR 4/4) concretions (iron oxide); many black (10YR 2/1) organic stains; few black (10YR 2/1) fillings in root channels; slightly acid.

The thickness of the solum ranges from 45 to more than 60 inches. The A or Ap horizon is 6 to 9 inches thick. It has value of 3 and chroma of 1 or 2. The E horizon has value of 4 or 5 and chroma of 1 or 2. The Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 or 2. The content of clay is 36 to 42 percent in the finest textured part of this horizon.

Shaffton Series

The Shaffton series consists of somewhat poorly drained soils on flood plains. These soils formed in loamy and sandy alluvium. This native vegetation was prairie grasses. Permeability is moderate in the upper part of the profile and rapid in the lower part. Slopes range from 0 to 2 percent.

Typical pedon of Shaffton loam, 0 to 2 percent slopes, in an area of cropland; 350 feet west and 1,100 feet south of the center of sec. 32, T. 73 N., R. 1 W.

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak very fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

AB—11 to 19 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; mixed with a small amount of very dark grayish brown (10YR 3/2) material; few fine faint dark brown (7.5YR 3/4) mottles; weak very fine subangular blocky structure; friable; common fine roots; neutral; clear wavy boundary.

Bw1—19 to 23 inches; brown (10YR 4/3) loam; common fine faint dark grayish brown (10YR 4/2) and few fine faint yellowish brown (10YR 5/4) mottles; weak very fine subangular blocky structure; friable; few fine roots; few fine dark concretions (manganese oxide); medium acid; clear wavy boundary.

Bw2—23 to 30 inches; brown (10YR 4/3) loam; common fine faint dark grayish brown (10YR 4/2), few fine faint yellowish brown (10YR 5/4), and few fine distinct strong brown (7.5YR 4/6) mottles; weak fine subangular blocky structure; friable; few fine roots; medium acid; gradual wavy boundary.

Bw3—30 to 40 inches; brown (10YR 4/3) sandy loam; many fine and medium grayish brown (10YR 5/2) and common fine faint yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; very friable; few fine roots; medium acid; clear wavy boundary.

Bw4—40 to 50 inches; brown (10YR 5/3 and 4/3) sandy loam; common fine faint grayish brown (10YR 5/2) and few fine distinct yellowish brown (10YR 5/6) and brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; very friable; few fine roots; medium acid; clear wavy boundary.

C1—50 to 58 inches; brown (10YR 5/3) sand; single grained; loose; slightly acid; abrupt wavy boundary.

C2—58 to 60 inches; mottled grayish brown (10YR 5/2) and brown (10YR 5/3) loamy sand; few fine faint yellowish brown (10YR 5/4) and few fine distinct brown (7.5YR 4/4) mottles; massive; very friable; slightly acid.

The thickness of the solum ranges from 35 to 55 inches. The thickness of the mollic epipedon ranges from 10 to 20 inches.

The A horizon has value of 2 or 3 and chroma of 1 to 3. It ranges from strongly acid to neutral. The Bw horizon is medium acid or strongly acid. The upper part of this horizon is loam. Its clay content decreases and its sand content increases with increasing depth. The lower part of the Bw horizon is sandy loam, loamy sand, or sand. The C horizon has value of 5 and chroma of 2 or 3.

Sparta Series

The Sparta series consists of excessively drained, rapidly permeable soils on ridges and convex side slopes in the uplands and on stream terraces. These soils formed in wind-deposited sandy material or in sandy alluvium that has been reworked by the wind. The native vegetation was prairie grasses. Slopes range from 0 to 9 percent.

Typical pedon of Sparta sand, 2 to 5 percent slopes, in an area of cropland; 2,310 feet west and 360 feet south of the northeast corner of sec. 26, T. 76 N., R. 5 W.

Ap—0 to 10 inches; very dark brown (10YR 2/2) sand, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; neutral; clear smooth boundary.

A—10 to 15 inches; very dark grayish brown (10YR 3/2) sand, brown (10YR 4/3) dry; weak medium subangular blocky structure; very friable; slightly acid; clear smooth boundary.

AB—15 to 22 inches; very dark grayish brown (10YR 3/2) sand, brown (10YR 4/3) dry; weak medium subangular blocky structure; very friable; medium acid; abrupt smooth boundary.

Bw1—22 to 32 inches; dark brown (10YR 3/3) sand, brown (10YR 4/3) dry; weak medium subangular blocky structure; very friable; medium acid; clear smooth boundary.

Bw2—32 to 42 inches; dark yellowish brown (10YR 4/4) sand; weak coarse prismatic structure; very friable; medium acid; gradual smooth boundary.

C—42 to 60 inches; strong brown (7.5YR 4/6) sand; single grained; loose; one 3- to 5-inch dark brown (10YR 3/3) clay band and one 1-inch dark brown (7.5YR 3/2) clay band; medium acid.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 16 to 24 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is loamy sand or sand. It is medium acid to neutral. The Bw horizon has value of 3 to 5 and chroma of 3 to 6. It is dominantly sand, but the range includes loamy fine sand. This horizon is slightly acid to strongly acid. The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6.

Sperry Series

The Sperry series consists of very poorly drained, slowly permeable soils in slight depressions on the broad tops of ridges in the uplands. These soils formed in loess. The native vegetation was prairie grasses. Slopes are 0 to 1 percent.

Typical pedon of Sperry silt loam, 0 to 1 percent slopes, in an area of cropland; 1,520 feet west and 1,440 feet south of the northeast corner of sec. 32, T. 73 N., R. 4 W.

Ap—0 to 10 inches; black (10YR 2/1) silt loam (21 percent clay), dark gray (10YR 4/1) dry; weak fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

E—10 to 19 inches; dark gray (10YR 4/1) silt loam (21 percent clay), gray (10YR 6/1) dry; very dark gray (10YR 3/1) coatings on faces of peds; few fine distinct yellowish brown (10YR 5/4) and common fine distinct dark grayish brown (2.5Y 4/2) mottles; weak medium platy structure parting to weak fine subangular blocky; friable; few fine roots; slightly acid; abrupt smooth boundary.

Btg1—19 to 25 inches; dark gray (5Y 4/1) silty clay (48 percent clay); common fine faint olive gray (5Y 4/2) and few fine prominent strong brown (7.5YR 4/6) mottles; moderate fine prismatic structure parting to moderate fine subangular blocky; firm; thin continuous clay films; few fine roots; medium acid; clear smooth boundary.

Btg2—25 to 35 inches; gray (5Y 5/1) silty clay (42 percent clay); common fine distinct yellowish brown (10YR 5/6), olive (5Y 5/4), and olive gray (5Y 4/2) mottles; moderate fine prismatic structure parting to moderate fine subangular blocky; firm; thin continuous clay films; few fine roots; few fine pores; medium acid; clear smooth boundary.

Btg3—35 to 44 inches; olive gray (5Y 5/2) silty clay loam (38 percent clay); common fine distinct olive (5Y 5/4), light olive brown (2.5Y 5/6), and yellowish brown (10YR 5/8) mottles; moderate fine prismatic structure parting to moderate medium subangular blocky; firm; thin nearly continuous clay films; few fine pores; medium acid; gradual smooth boundary.

BCg—44 to 54 inches; light olive gray (5Y 6/2) silty clay loam (38 percent clay); common medium distinct yellowish brown (10YR 5/6 and 5/8) and common fine distinct light olive brown (2.5Y 5/6) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; friable; thin discontinuous clay films; few fine pores; few fine dark concretions (manganese oxide); slightly acid; clear smooth boundary.

Cg—54 to 60 inches; light olive gray (5Y 6/2) silty clay loam; common medium distinct yellowish brown (10YR 5/8) and common fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; few fine pores; few fine dark concretions (manganese oxide); slightly acid.

The thickness of the solum ranges from 48 to more than 60 inches. The mollic epipedon is 10 to 12 inches thick.

The A or Ap horizon has value of 2 or 3 and chroma of 1. The A horizon is neutral to medium acid. The E horizon has value of 3 or 4 and chroma of 1 or 2. The Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 to 5, and chroma of 1 or 2. It is strongly acid or medium acid. The content of clay in this horizon is 36 to 45 percent. The Cg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2.

Stronghurst Series

The Stronghurst series consists of somewhat poorly drained, moderately permeable soils on the tops of ridges in the uplands. These soils formed in loess. The native vegetation was deciduous trees. Slopes range from 0 to 2 percent.

Typical pedon of Stronghurst silt loam, 0 to 2 percent slopes, in an area of cropland; 1,540 feet west and 300 feet south of the northeast corner of sec. 22, T. 75 N., R. 3 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam (18 percent clay), light brownish gray (10YR 6/2) dry; weak very fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

E—6 to 14 inches; dark grayish brown (10YR 4/2) silt loam (18 percent clay), light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure parting to weak medium platy; friable; few fine roots; few fine pores; slightly acid; clear smooth boundary.

BE—14 to 18 inches; brown (10YR 4/3) silty clay loam (28 percent clay); dark grayish brown (10YR 4/2) coatings on faces of peds; moderate medium subangular blocky structure; friable; few discontinuous clay films; silt coatings, light gray (10YR 7/2) dry; few fine roots; few fine pores; medium acid; clear smooth boundary.

Bt1—18 to 23 inches; grayish brown (10YR 5/2) and brown (10YR 5/3) silty clay loam (35 percent clay) few fine faint yellowish brown (10YR 5/6) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; thin nearly continuous clay films; continuous silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine roots; few fine pores; strongly acid; gradual smooth boundary.

Bt2—23 to 30 inches; yellowish brown (10YR 5/4) silty clay loam (35 percent clay); few fine distinct strong brown (7.5YR 5/6) and common fine distinct yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/4) mottles; moderate fine prismatic structure parting to moderate fine subangular blocky; friable; thin discontinuous clay films; discontinuous silt coatings, light gray (10YR 7/2) dry; few fine roots; few fine pores; strongly acid; gradual smooth boundary.

Btg1—30 to 36 inches; grayish brown (2.5Y 5/2) silty clay loam (34 percent clay); few fine distinct strong brown (7.5YR 4/6), yellowish brown (10YR 5/6), and olive (5Y 5/3) and common fine distinct yellowish brown (10YR 5/8) mottles; weak medium prismatic structure parting to weak medium

subangular blocky; friable; thin discontinuous clay films; discontinuous silt coatings, light gray (10YR 7/2) dry; few fine roots; few fine pores; strongly acid; gradual smooth boundary.

Btg2—36 to 43 inches; grayish brown (2.5Y 5/2) silty clay loam (34 percent clay); common fine and medium faint light olive brown (2.5Y 5/4) and common fine distinct light olive brown (2.5Y 5/6) mottles; weak fine prismatic structure parting to weak medium subangular blocky; friable; thin discontinuous clay films; few fine black (10YR 2/1) and very dark gray (10YR 3/1) fillings in root channels; discontinuous silt coatings, light gray (10YR 7/2) dry; medium acid; gradual smooth boundary.

BCg—43 to 48 inches; light brownish gray (2.5Y 6/2) silty clay loam (33 percent clay); common medium distinct light olive brown (2.5Y 5/6) and few fine faint light olive brown (2.5Y 5/4) mottles; weak medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; discontinuous silt coatings, light gray (10YR 7/2) dry; common fine dark concretions (manganese oxide); slightly acid; gradual smooth boundary.

Cg—48 to 60 inches; light brownish gray (2.5Y 6/2) silt loam (26 percent clay); common fine distinct yellowish brown (10YR 5/6), few fine distinct strong brown (7.5YR 4/6), and common medium distinct reddish yellow (7.5YR 6/8) mottles; massive; friable; few fine black (10YR 2/1) fillings in root channels; common fine dark concretions (manganese oxide); neutral.

The thickness of the solum ranges from 42 to more than 60 inches. The surface layer is 1 to 9 inches thick.

The Ap or A horizon has value of 4 or 5 and chroma of 1 or 2. It is medium acid to neutral. The E horizon has value of 4 to 6 and chroma of 2. The Btg horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 1 to 4. It is strongly acid or medium acid. The content of clay in this horizon ranges from 27 to 35 percent. The C horizon has colors similar to those of the B horizon.

Taintor Series

The Taintor series consists of poorly drained, moderately slowly permeable soils on the tops of ridges in the uplands. These soils formed in loess. The native vegetation was prairie grasses. Slopes range from 0 to 2 percent.

Typical pedon of Taintor silty clay loam, 0 to 2 percent slopes, in an area of cropland; 1,300 feet south and 150 feet east of the northwest corner of sec. 6, T. 74 N., R. 5 W.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam (30 percent clay), dark gray (10YR 4/1) dry; moderate very fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

A1—8 to 14 inches; black (10YR 2/1) silty clay loam (30 percent clay), dark gray (10YR 4/1) dry; moderate fine granular structure; friable; common fine roots; few fine pores; slightly acid; clear smooth boundary.

A2—14 to 18 inches; black (10YR 2/1) silty clay loam (39 percent clay), very dark gray (10YR 3/1) dry; few fine distinct dark yellowish brown (10YR 4/4) and few fine distinct dark grayish brown (2.5Y 4/2) mottles; moderate very fine subangular blocky structure; firm; common fine roots; few fine pores; slightly acid; clear wavy boundary.

A3—18 to 23 inches; very dark gray (10YR 3/1) silty clay loam (38 percent clay), dark gray (10YR 4/1) dry; many black (10YR 2/1) coatings on faces of peds; common fine faint dark grayish brown (2.5Y 4/2) and common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate very fine subangular blocky structure; firm; few fine roots; few fine pores; few fine dark concretions (manganese oxide); medium acid; clear wavy boundary.

Btg1—23 to 30 inches; mottled olive gray (5Y 4/2 and 5/2) silty clay loam (38 percent clay); common very dark gray (10YR 3/1) coatings on faces of peds; common fine distinct yellowish brown (10YR 5/4) mottles; moderate fine subangular blocky structure; thin continuous clay films; firm; few fine roots; few fine pores; few fine dark concretions (manganese oxide); slightly acid; gradual wavy boundary.

Btg2—30 to 35 inches; olive gray (5Y 5/2) silty clay loam (38 percent clay); common fine prominent dark yellowish brown (10YR 4/4) and few fine prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm; thin nearly continuous clay films; few fine roots; few fine pores; very dark gray (10YR 3/1) fillings in old root channels; few very dark gray (10YR 3/1) stains on vertical faces of peds; slightly acid; gradual smooth boundary.

Btg3—35 to 42 inches; olive gray (5Y 5/2) silty clay loam (38 percent clay); common fine and medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; thin discontinuous clay films; few fine roots; few fine pores; few fine very dark gray (10YR 3/1) organic fillings in old root channels; very dark gray (10YR 3/1) coatings on vertical faces of some peds; few fine dark concretions (manganese oxide); slightly acid; gradual wavy boundary.

BCg—42 to 50 inches; olive gray (5Y 5/2) silty clay loam (33 percent clay); common fine and medium prominent strong brown (7.5YR 5/6) and common fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few

fine roots; few fine pores; common fine very dark gray (10YR 3/1) organic fillings in old root channels; few fine dark concretions (manganese oxide); slightly acid; gradual wavy boundary.

Cg—50 to 60 inches; olive gray (5Y 5/2) silty clay loam (33 percent clay); common fine distinct strong brown (7.5YR 5/6) mottles; massive; friable; few fine dark gray (10YR 4/1) organic fillings in old root channels; few fine dark concretions (manganese oxide); slightly acid.

The thickness of the solum ranges from 45 to more than 60 inches. The thickness of the mollic epipedon ranges from 16 to 24 inches.

The A horizon has value of 2 or 3 and chroma of 0 or 1. It is neutral to medium acid. The content of clay in this horizon is 30 to 39 percent. The Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 or 2. It is slightly acid or medium acid. The content of clay is 36 to 42 percent in the finest textured part of this horizon. The C horizon typically has value of 4 or 5 and chroma of 2.

Tama Series

The Tama series consists of well drained, moderately permeable soils on convex ridgetops and side slopes in the uplands. These soils formed in loess. The native vegetation was prairie grasses. Slopes range from 2 to 9 percent.

Typical pedon of Tama silty clay loam, 2 to 5 percent slopes, in an area of cropland; 96 feet west and 147 feet north of the center of sec. 3, T. 75 N., R. 4 W.

Ap—0 to 6 inches; very dark brown (10YR 2/2) silty clay loam (28 percent clay), grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

A—6 to 12 inches; very dark brown (10YR 2/2) silty clay loam (29 percent clay), grayish brown (10YR 5/2) dry; weak fine granular structure; friable; few fine roots; few fine pores; slightly acid; clear smooth boundary.

AB—12 to 18 inches; very dark grayish brown (10YR 3/2) silty clay loam (31 percent clay), grayish brown (10YR 5/2) dry; very dark gray (10YR 3/1) coatings on faces of peds; weak fine granular structure; friable; few fine roots; few fine pores; slightly acid; clear smooth boundary.

Bt1—18 to 24 inches; brown (10YR 4/3) silty clay loam (35 percent clay); dark brown (10YR 3/3) coatings on faces of some peds; moderate fine subangular blocky structure; friable; thin discontinuous clay films; few silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine roots; few fine pores; medium acid; clear smooth boundary.

Bt2—24 to 29 inches; brown (10YR 4/3) silty clay loam (35 percent clay); mixed with some yellowish brown (10YR 5/4) material; dark yellowish brown (10YR 3/4) coatings on faces of some peds; moderate fine subangular blocky structure; friable; thin discontinuous clay films; few silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine roots; few fine pores; medium acid; clear smooth boundary.

Bt3—29 to 35 inches; yellowish brown (10YR 5/4) silty clay loam (33 percent clay); brown (10YR 4/3) coatings on faces of some peds and dark brown (10YR 3/3) coatings on faces of very few peds; moderate fine subangular blocky structure; friable; thin discontinuous clay films; few silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine pores; medium acid; clear smooth boundary.

Bt4—35 to 41 inches; yellowish brown (10YR 5/4) silty clay loam (31 percent clay); brown (10YR 4/3) coatings on faces of some peds; few fine faint brown (10YR 5/3) mottles; weak medium subangular blocky structure parting to weak fine subangular blocky; friable; thin discontinuous clay films; few silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine pores; slightly acid; gradual smooth boundary.

Bt5—41 to 50 inches; yellowish brown (10YR 5/4) silty clay loam (30 percent clay); brown (10YR 5/3) coatings on faces of a few peds; few fine faint brown (10YR 5/3) mottles; weak fine prismatic structure parting to weak medium subangular blocky; friable; few patchy clay films; few silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine pores; slightly acid; gradual smooth boundary.

BC—50 to 58 inches; yellowish brown (10YR 5/4) silty clay loam (28 percent clay); few fine faint grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to weak medium subangular blocky; friable; very few patchy clay films; few fine pores; slightly acid; gradual smooth boundary.

C—58 to 60 inches; yellowish brown (10YR 5/4) silt loam (25 percent clay); few fine faint grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; massive; friable; slightly acid.

The thickness of the solum ranges from 36 to more than 60 inches. The thickness of the mollic epipedon ranges from 10 to 20 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is neutral to medium acid. The Bt horizon has value of 4 or 5 and chroma of 3 or 4. It is medium acid or slightly acid. The content of clay is 27 to 35 percent in the finest textured part of this horizon. The C horizon has colors similar to those of the Bt horizon.

Tell Series

The Tell series consists of well drained soils on convex ridgetops and side slopes in the uplands and on stream terraces. These soils formed in loess or silty sediments. The native vegetation was deciduous trees. Permeability is moderate in the upper part of the solum and rapid in the lower part and in the substratum. Slopes range from 5 to 14 percent.

Typical pedon of Tell silt loam, 9 to 14 percent slopes, moderately eroded, in an area of cropland; 1,025 feet north and 102 feet west of the southeast corner of sec. 31, T. 74 N., R. 2 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam (21 percent clay), pale brown (10YR 6/3) dry; mixed with some yellowish brown (10YR 5/4) material; weak fine granular structure; friable; common very fine roots; slightly acid; abrupt smooth boundary.

Bt1—7 to 15 inches; yellowish brown (10YR 5/4) silty clay loam (29 percent clay); brown (10YR 4/3) coatings on faces of peds; common fine distinct light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; thin discontinuous brown (10YR 4/3) clay films; few prominent silt coatings, light gray (10YR 7/2) dry; few very fine roots; few very fine dark concretions (manganese oxide); slightly acid; gradual smooth boundary.

Bt2—15 to 23 inches; yellowish brown (10YR 5/4) silty clay loam (33 percent clay); brown (10YR 5/3) coatings on faces of peds; common fine and medium light brownish gray (2.5Y 6/2) and common fine distinct strong brown (7.5YR 4/6 and 5/6) mottles; weak fine subangular blocky structure; friable; thin nearly continuous clay films; few prominent silt coatings, light gray (10YR 7/2) dry; few very fine roots; few very fine dark concretions (manganese oxide); medium acid; gradual smooth boundary.

Bt3—23 to 32 inches; brown (10YR 5/3) sandy clay loam (25 percent clay); mixed with about 20 percent yellowish brown (10YR 5/4) material; brown (10YR 5/3) coatings on faces of peds; common fine distinct strong brown (7.5YR 5/6) and many fine distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; thin discontinuous clay films; common prominent silt coatings, light gray (10YR 7/2) dry; few very fine roots; few fine dark concretions (manganese oxide); medium acid; abrupt wavy boundary.

2Bt4—32 to 45 inches; yellowish brown (10YR 5/6) loamy sand (8 percent clay); few yellowish brown (10YR 5/4) coatings on faces of peds; common fine distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; very friable; common clay bridges; slightly acid; clear smooth boundary.

2C—45 to 60 inches; yellowish brown (10YR 5/6) loamy sand (8 percent clay); common fine distinct yellowish brown (10YR 5/8) and few fine distinct strong brown (7.5YR 5/6) mottles; single grained; loose; 1-inch clay bands at depths of 49, 55, and 59 inches; slightly acid.

The thickness of the solum ranges from 20 to 48 inches. The surface layer is 2 to 8 inches thick.

The A or Ap horizon has value of 3 or 4 and chroma of 2 or 3. It has value of 3 when moist only in pedons where it has value of 6 or more when dry. The E horizon, if it occurs, has value of 4 or 5 and chroma of 3 or 4. The 2Bt and 2C horizons are sand or loamy sand. The 2Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. The 2C horizon has value of 4 to 6 and chroma of 3 to 6.

Titus Series

The Titus series consists of poorly drained, slowly permeable soils on flood plains. These soils formed in silty alluvium. The native vegetation was prairie grasses. Slopes range from 0 to 2 percent.

Typical pedon of Titus silty clay loam, 0 to 2 percent slopes, in an area of cropland; 70 feet west and 1,550 feet north of the center of sec. 6, T. 73 N., R. 3 W.

Ap—0 to 6 inches; black (10YR 2/1) silty clay loam (38 percent clay), very dark gray (10YR 3/1) dry; weak fine granular structure; friable; common roots; neutral; abrupt smooth boundary.

A1—6 to 14 inches; black (10YR 2/1) silty clay loam (38 percent clay), very dark gray (10YR 3/1) dry; weak fine and very fine granular structure; friable; few fine roots; neutral; gradual smooth boundary.

A2—14 to 20 inches; black (10YR 2/1) silty clay loam (38 percent clay), very dark gray (10YR 3/1) dry; common fine distinct dark gray (5Y 4/1) mottles; weak fine granular and subangular blocky structure; friable; few fine roots; slightly acid; gradual smooth boundary.

Btg1—20 to 28 inches; dark gray (10YR 4/1) silty clay loam (37 percent clay); very dark gray (10YR 3/1) coatings on faces of peds; common fine faint dark gray (5Y 4/1) and olive gray (5Y 5/2) mottles; weak very fine prismatic structure parting to weak fine and very fine subangular blocky; firm; few thin patchy clay films; slightly acid; clear smooth boundary.

Btg2—28 to 34 inches; olive gray (5Y 4/2) silty clay loam (36 percent clay); dark gray (5Y 4/1) coatings on faces of peds; common fine faint olive gray and olive (5Y 5/2 and 5/3) mottles; weak fine prismatic structure parting to weak fine and very fine subangular blocky; firm; thin discontinuous clay

films; black (10YR 2/1) krotovina 2 inches in diameter; slightly acid; clear smooth boundary.

Btg3—34 to 40 inches; olive gray (5Y 4/2) silty clay loam (35 percent clay); few dark gray (5Y 4/1) coatings on faces of peds; common fine distinct light olive brown (2.5Y 5/4) and common fine faint olive gray (5Y 5/2) and olive (5Y 5/4) mottles; weak fine prismatic structure parting to weak fine subangular blocky; firm; thin discontinuous clay films; few dark concretions (manganese oxide); slightly acid; gradual smooth boundary.

Btg4—40 to 48 inches; olive gray (5Y 5/2) silty clay loam (36 percent clay); few dark gray (5Y 4/1) coatings on faces of peds; common fine distinct light olive brown (2.5Y 5/6) and many fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak fine prismatic structure parting to weak medium subangular blocky; friable; few thin discontinuous clay films; common dark concretions (manganese oxide); neutral; gradual smooth boundary.

BCg—48 to 60 inches; olive gray (5Y 5/2) silty clay loam (39 percent clay), grading to light olive gray (5Y 6/2) in the lower part; common fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak medium prismatic structure parting to weak medium and coarse subangular blocky; friable; few dark concretions (manganese oxide); very dark gray (10YR 3/1) krotovina 2 inches in diameter; neutral.

The thickness of the solum ranges from 40 to more than 60 inches. The thickness of the mollic epipedon ranges from 18 to 24 inches.

The A horizon has value of 2 or 3 and chroma of 0 or 1. It is neutral or slightly acid. The Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 or 2. It is neutral to medium acid. The content of clay is 36 to 40 percent in the finest textured part of this horizon.

Toolesboro Series

The Toolesboro series consists of poorly drained soils on flood plains. These soils formed in loamy and sandy alluvium. The native vegetation was mixed sedges, water-tolerant grasses, and trees. Permeability is moderately rapid in the upper part of the solum and very rapid in the lower part and in the substratum. Slopes range from 0 to 2 percent.

Typical pedon of Toolesboro loam, 0 to 2 percent slopes, in an area of cropland; 675 feet east and 160 feet south of the northwest corner of sec. 29, T. 75 N., R. 2 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak very fine granular structure; friable; common fine roots; some undecomposed plant material; neutral; abrupt smooth boundary.

A—9 to 13 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; brown (7.5YR 4/2) coatings on faces of peds and few very dark grayish brown (10YR 3/2) coatings on faces of some peds; many fine faint brown (7.5YR 4/4), few fine prominent reddish brown (5YR 4/4), and few fine faint brown (7.5YR 4/2) mottles; weak fine granular structure; friable; few fine roots; very dark grayish brown (10YR 3/2) fillings in old root channels; medium acid; clear wavy boundary.

Bw1—13 to 20 inches; dark brown (7.5YR 3/4) sandy loam; common fine faint strong brown (7.5YR 4/6) and few fine faint brown (7.5YR 4/2) mottles; weak fine subangular blocky structure; very friable; very dark grayish brown (10YR 3/2) fillings in old root channels; slightly acid; clear wavy boundary.

Bw2—20 to 30 inches; brown (7.5YR 4/4) sandy loam; few fine faint brown (7.5YR 4/2) and few fine faint strong brown (7.5YR 4/6) mottles; weak medium subangular blocky structure; very friable; neutral; gradual wavy boundary.

BC—30 to 36 inches; dark yellowish brown (10YR 4/4) loamy sand; few medium faint brown (7.5YR 4/4) mottles; weak coarse prismatic structure; very friable; neutral; clear wavy boundary.

C—36 to 60 inches; dark yellowish brown (10YR 4/4) loamy sand; massive; very friable; neutral.

The solum ranges from 30 to about 55 inches in thickness. It is neutral to medium acid in the upper part and generally is neutral or slightly acid in the lower part.

The A horizon is 6 to 10 inches thick. It has value of 2 or 3 and chroma of 1 or 2. It generally is loam, but the range includes clay loam and sandy clay loam. The Bw horizon has value of 3 to 5 and chroma of 2 to 6. The upper part of this horizon is clay loam, sandy clay loam, or sandy loam.

Traer Series

The Traer series consists of poorly drained, slowly permeable soils on the tops of ridges in the uplands. These soils formed in loess. The native vegetation was deciduous trees. Slopes range from 0 to 2 percent.

Typical pedon of Traer silt loam, 0 to 2 percent slopes, in an area of cropland; 650 feet west and 460 feet south of the center of sec. 35, T. 75 N., R. 3 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam (16 percent clay), light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; friable; many roots; medium acid; abrupt smooth boundary.

E—9 to 13 inches; grayish brown (10YR 5/2) silt loam (22 percent clay), light gray (10YR 7/2) dry; few fine distinct strong brown (7.5YR 5/6) mottles; weak medium platy structure parting to weak very fine

subangular blocky; friable; common fine roots; common fine dark concretions (manganese oxide); very strongly acid; clear smooth boundary.

Btg1—13 to 20 inches; dark grayish brown (10YR 4/2) silty clay loam (37 percent clay); common fine faint grayish brown (10YR 5/2) and common fine distinct brown (7.5YR 4/4) and strong brown (7.5YR 5/8) mottles; moderate fine angular blocky structure; firm; thin continuous clay films; continuous silt coatings, light gray (10YR 7/2) dry; common fine roots; few fine dark concretions (manganese oxide); very strongly acid; gradual smooth boundary.

Btg2—20 to 26 inches; mottled dark grayish brown (10YR 4/2), grayish brown (2.5Y 5/2), and olive (5Y 5/3) silty clay loam (38 percent clay); common fine distinct brown (7.5YR 4/4) and strong brown (7.5YR 5/6) mottles; moderate fine subangular blocky structure; firm; thin continuous clay films; common fine roots; few very dark gray (10YR 3/1) fillings in old root channels; common fine dark concretions (manganese oxide); very strongly acid; gradual smooth boundary.

Btg3—26 to 32 inches; olive (5Y 5/3) silty clay loam (37 percent clay); common fine faint olive gray (5Y 5/2), common fine prominent strong brown (7.5YR 5/6), and common fine distinct dark grayish brown (10YR 4/2) mottles; moderate fine subangular blocky structure; friable; thin continuous clay films; common fine roots; common fine dark concretions (manganese oxide); very strongly acid; gradual smooth boundary.

Btg4—32 to 42 inches; olive (5Y 5/3) silty clay loam (31 percent clay); few fine faint olive gray (5Y 5/2), common fine prominent strong brown (7.5YR 5/6 and 5/8), few fine prominent brown (7.5YR 4/4), and common fine and medium distinct brown (10YR 4/3) mottles; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; thin discontinuous clay films; few fine roots; very dark gray (10YR 3/1) fillings in old root channels; common fine dark concretions (manganese oxide); strongly acid; gradual smooth boundary.

Btg5—42 to 51 inches; mottled yellowish brown (10YR 5/6) and olive (5Y 5/3) silty clay loam (30 percent clay); common fine distinct dark grayish brown (10YR 4/2), common fine faint olive gray (5Y 5/2), and few fine distinct brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to weak fine and medium subangular blocky; friable; thin discontinuous clay films; few fine roots; common fine dark concretions (manganese oxide); strongly acid; gradual smooth boundary.

BCg—51 to 60 inches; olive gray (5Y 5/2) silty clay loam (30 percent clay); common fine distinct dark grayish brown (10YR 4/2), common fine prominent strong brown (7.5YR 5/6), and few fine prominent brown (7.5YR 4/4) mottles; weak medium prismatic structure; friable; thin discontinuous clay films; common fine dark concretions (manganese oxide); strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The surface layer is 5 to 9 inches thick.

The A or Ap horizon is medium acid to neutral. It has value of 3 or 4 and chroma of 1 or 2. Value is 3 only in undisturbed pedons where the surface layer is less than 3 inches thick or where it has value of 6 or more when dry. The E horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 or 2. It typically is very strongly acid or strongly acid. The Btg horizon has hue of 10YR, 2.5Y, and 5Y, value of 4 or 5, and chroma of 2 to 6. The content of clay in the upper 20 inches of the argillic horizon is 36 and 40 percent.

Tuskeego Series

The Tuskeego series consists of poorly drained, very slowly permeable soils on low stream terraces and slightly depressional bottom land. These soils formed in silty alluvium. The native vegetation was prairie grasses and deciduous trees. Slopes range from 0 to 2 percent.

Typical pedon of Tuskeego silt loam, 0 to 2 percent slopes, in an area of cropland; 1,336 feet east and 1,255 feet south of the northwest corner of sec. 12, T. 76 N., R. 5 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam (22 percent clay), gray (10YR 5/1) dry; weak fine granular structure; friable; neutral; clear smooth boundary.

E—9 to 17 inches; dark gray (10YR 4/1) silt loam (25 percent clay), light brownish gray (10YR 6/2) dry, dark brown (10YR 3/3) kneaded; few medium faint gray (10YR 5/1) and few fine distinct strong brown (7.5YR 5/8 and 4/6) mottles; weak thin and very thin platy structure; friable; few fine roots; neutral; clear smooth boundary.

Btg1—17 to 20 inches; dark gray (10YR 4/1) silty clay loam (36 percent clay); few fine distinct reddish yellow (7.5YR 6/8), strong brown (7.5YR 5/6), and dark brown (7.5YR 3/4) mottles; weak fine and very fine subangular blocky structure; firm; thin discontinuous clay films; few thin discontinuous silt coatings, light gray (10YR 7/2) dry; few fine roots; slightly acid; clear smooth boundary.

Btg2—20 to 25 inches; dark gray (10YR 4/1) silty clay (42 percent clay); few fine distinct strong brown (7.5YR 4/6 and 5/8), dark brown (7.5YR 3/4), and grayish brown (2.5Y 5/2) mottles; weak fine and very fine subangular blocky structure; firm; thin discontinuous clay films; few silt coatings, light gray (10YR 7/2) dry; few fine roots; medium acid; clear smooth boundary.

Btg3—25 to 30 inches; dark gray (10YR 4/1) silty clay loam (39 percent clay); few fine prominent yellow (10YR 7/8) and common fine distinct grayish brown (2.5Y 5/2), strong brown (7.5YR 4/6 and 5/8), and dark brown (7.5YR 3/4) mottles; weak medium angular blocky structure; firm; thin continuous clay films; few fine roots; medium acid; clear smooth boundary.

Btg4—30 to 39 inches; grayish brown (2.5Y 5/2) silty clay loam (37 percent clay); common fine distinct strong brown (7.5YR 5/8) and yellowish red (5YR 4/6) mottles; weak medium prismatic structure parting to weak medium angular blocky; firm; thin discontinuous clay films; few fine roots; slightly acid; clear smooth boundary.

Btg5—39 to 47 inches; grayish brown (2.5Y 5/2) silty clay (48 percent clay); few fine distinct dark gray (5Y 4/1) and common fine distinct strong brown (7.5YR 4/6 and 5/8) and dark brown (7.5YR 3/4) mottles; weak medium prismatic structure; firm; thin discontinuous clay films; few silt coatings, light gray (10YR 7/1) dry; few fine roots; few fine dark concretions (manganese oxide); slightly acid; gradual smooth boundary.

Btg6—47 to 60 inches; mottled grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) silty clay loam (37 percent clay); few fine distinct dark gray (5Y 4/1) and dark brown (7.5YR 3/4) and common fine distinct strong brown (7.5YR 5/6 and 4/6) mottles; weak medium prismatic structure; firm; thin discontinuous clay films; few fine roots; many fine root pores; very dark gray (10YR 3/1) organic coatings in the larger pores; few fine dark concretions (manganese oxide); slightly acid.

The thickness of the solum ranges from 48 to 60 inches or more. The surface layer is 6 to 10 inches thick.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It ranges from strongly acid to neutral. The B horizon is strongly acid to slightly acid. The Btg horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. The content of clay in this horizon is 38 to 48 percent.

Walford Series

The Walford series consists of poorly drained, moderately slowly permeable soils on the tops of ridges in the uplands. These soils formed in loess. The native vegetation was mixed prairie grasses and deciduous trees. Slopes are 0 to 1 percent.

Typical pedon of Walford silt loam, 0 to 1 percent slopes, in an area of cropland; 820 feet south and 425 feet east of the center of sec. 27, T. 75 N., R. 3 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam (21 percent clay), grayish brown (10YR 5/2) dry; weak fine granular structure; friable; few fine roots; medium acid; abrupt smooth boundary.

E—9 to 19 inches; dark grayish brown (10YR 4/2) silt loam (25 percent clay), light brownish gray (10YR 6/2) dry; very dark grayish brown (10YR 3/2) coatings on faces of plates; few fine faint grayish brown (10YR 5/2) mottles; weak thin and medium platy structure; friable; few fine roots; medium acid; clear smooth boundary.

BEg—19 to 23 inches; grayish brown (10YR 5/2) silty clay loam (33 percent clay); common fine distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; few fine roots; common silt coatings, light brownish gray (10YR 6/2) dry; medium acid; gradual smooth boundary.

Btg1—23 to 30 inches; grayish brown (2.5Y 5/2) silty clay loam (33 percent clay); common fine faint dark gray (10YR 4/1) and many fine distinct brown (7.5YR 4/4) and strong brown (7.5YR 5/6) mottles; moderate fine subangular blocky structure; firm; thin continuous clay films; strongly acid; gradual smooth boundary.

Btg2—30 to 37 inches; grayish brown (2.5Y 5/2) silty clay loam (33 percent clay); common fine faint light brownish gray (2.5Y 6/2) and common fine distinct brown (7.5YR 4/4) and strong brown (7.5YR 5/6 and 5/8) mottles; weak fine prismatic structure; firm; thin nearly continuous clay films; very dark gray (10YR 3/1) organic fillings in old root channels; strongly acid; gradual smooth boundary.

Btg3—37 to 43 inches; light brownish gray (2.5Y 6/2) silty clay loam (33 percent clay); common fine distinct brown (7.5YR 4/4) and strong brown (7.5YR 5/6) mottles; weak fine and medium prismatic structure; firm; thin nearly continuous clay films; very dark gray (10YR 3/1) organic fillings in old root channels; medium acid; gradual smooth boundary.

Btg4—43 to 52 inches; light brownish gray (2.5Y 6/2) silty clay loam (29 percent clay); common fine faint grayish brown (2.5Y 5/2) and common fine distinct brown (7.5YR 4/4) and strong brown (7.5YR 5/6) mottles; weak medium prismatic structure; firm; thin discontinuous clay films; dark gray (10YR 4/1) organic fillings in old root channels; medium acid; gradual smooth boundary.

C—52 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam (29 percent clay); many medium distinct brown (7.5YR 4/4) and strong brown (7.5YR 5/6 and 5/8) mottles; massive; friable; dark gray (10YR 4/1) organic fillings in old root channels; medium acid.

The thickness of the solum ranges from 42 to more than 60 inches. The surface layer is 6 to 9 inches thick.

The Ap or A horizon has value of 3 and chroma of 1 or 2. It is neutral to medium acid. The E horizon has value of 4 to 6 and chroma of 1 or 2. The Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is medium acid or strongly acid. The

content of clay is 32 to 35 percent in this horizon. It is as much as 37 percent in some thin subhorizons. The C horizon has hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 1 or 2.

Watseka Series

The Watseka series consists of somewhat poorly drained, rapidly permeable soils on stream terraces. These soils formed in sandy alluvium, which has been reworked by the wind in most areas. The native vegetation was prairie grasses. Slopes range from 0 to 2 percent.

Typical pedon of Watseka loamy fine sand, 0 to 2 percent slopes, in an area of cropland; 924 feet east and 295 feet south of the center of sec. 26, T. 75 N., R. 4 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loamy fine sand, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; neutral; abrupt smooth boundary.

A—8 to 18 inches; very dark grayish brown (10YR 3/2) loamy fine sand, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; very friable; about 2 percent gravel; neutral; clear smooth boundary.

Bw1—18 to 26 inches; dark grayish brown (2.5Y 4/2) loamy fine sand; very dark grayish brown (10YR 3/2) coatings on faces of peds; few fine prominent strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; very friable; slightly acid; clear smooth boundary.

Bw2—26 to 38 inches; dark grayish brown (2.5Y 4/2) and grayish brown (2.5Y 5/2) loamy fine sand; few medium distinct dark brown (7.5YR 4/4) and very dark grayish brown (10YR 3/2) mottles; weak fine subangular blocky structure; very friable; slightly acid; gradual smooth boundary.

Bw3—38 to 46 inches; light olive brown (2.5Y 5/4) loamy fine sand; few medium distinct grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; very friable; dark brown (7.5YR 3/4) bands of sandy loam 0.5 to 1.0 inch thick; slightly acid; clear smooth boundary.

C—46 to 60 inches; light olive brown (2.5Y 5/4) and light yellowish brown (2.5Y 6/4) sand; single grained; loose; mottled dark grayish brown (10YR 4/2), dark yellowish brown (10YR 4/6), and dark brown (7.5YR 3/4) clay bands 0.5 to 1.0 inch thick; about 2 percent gravel; slightly acid.

The thickness of the solum ranges from 24 to more than 46 inches. The thickness of the mollic epipedon ranges from 10 to 20 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is slightly acid or neutral. The B horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is dominantly loamy fine sand, but the range includes loamy sand and sand. This horizon is slightly acid or medium acid. The C horizon has colors similar to those of the B horizon.

Whittier Series

The Whittier series consists of well drained soils on convex ridgetops and side slopes in the uplands and on stream terraces. These soils formed in loess and in the underlying sandy material. The native vegetation was mixed prairie grasses and deciduous trees. Permeability is moderate in the solum and rapid in the substratum. Slopes range from 2 to 14 percent.

Typical pedon of Whittier silt loam, 2 to 5 percent slopes, in an area of cropland; 900 feet west and 520 feet north of the center of sec. 4, T. 75 N., R. 4 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam (25 percent clay), grayish brown (10YR 5/2) dry; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

Bt1—8 to 15 inches; dark yellowish brown (10YR 4/4) silty clay loam (33 percent clay); few brown (10YR 4/3) coatings on faces of peds; weak fine subangular blocky structure; friable; thin discontinuous clay films; nearly continuous coatings, light gray (10YR 7/2) dry; few fine roots; slightly acid; gradual smooth boundary.

Bt2—15 to 23 inches; yellowish brown (10YR 5/4) silty clay loam (33 percent clay); nearly continuous brown (10YR 4/3) coatings on faces of peds; weak fine prismatic structure parting to weak fine and medium subangular blocky; friable; thin discontinuous clay films; nearly continuous silt coatings, light gray (10YR 7/2) dry; few fine roots; few fine pores; medium acid; gradual smooth boundary.

Bt3—23 to 34 inches; yellowish brown (10YR 5/4) silty clay loam (29 percent clay); nearly continuous brown (10YR 4/3) coatings on faces of peds; weak medium prismatic structure parting to weak medium subangular blocky; friable; thin nearly continuous clay films; silt coatings, light gray (10YR 7/2) dry; few fine roots; few fine pores; medium acid; clear wavy boundary.

2Bt4—34 to 39 inches; yellowish brown (10YR 5/6) sandy loam (14 percent clay); few dark yellowish brown (10YR 4/4) coatings on faces of peds; weak medium subangular blocky structure; very friable; few fine roots; common clay bridges between sand grains; medium acid; abrupt wavy boundary.

2C—39 to 60 inches; brownish yellow (10YR 6/6) loamy sand (4 percent clay); single grained; loose; yellowish brown (10YR 5/4) iron clay bands, 0.25 inch thick at a depth of 40 inches, 2.0 inches thick at a depth of 49 inches, and 0.75 inch thick at a depth of 54 inches; medium acid.

The thickness of the solum ranges from 30 to 48 inches. The Ap or A horizon is 6 to 9 inches thick.

The A horizon has value of 3 and chroma of 1 or 2. It is neutral to medium acid. The E horizon, if it occurs, has value of 4 and chroma of 2 or 3. The B horizon is slightly acid or medium acid. The upper part of this horizon has value of 4 or 5 and chroma of 3 or 4. The lower part has value of 4 or 5 and chroma of 4 to 6. The 2C horizon is loamy sand or sand.

Wiota Series

The Wiota series consists of well drained soils on low stream terraces. These soils formed in silty alluvium overlying sandy alluvium. The native vegetation was prairie grasses. Permeability is moderate in the solum and rapid in the substratum. Slopes range from 0 to 5 percent.

Typical pedon of Wiota silt loam, sandy substratum, 0 to 2 percent slopes, in an area of cropland; 1,090 feet south and 820 feet west of the center of sec. 25, T. 76 N., R. 5 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam (25 percent clay), grayish brown (10YR 5/2) dry; weak very fine granular structure; friable; common very fine roots; some fragments of undecomposed plant material; slightly acid; abrupt smooth boundary.

A—10 to 22 inches; very dark grayish brown (10YR 3/2) silt loam (25 percent clay), grayish brown (10YR 5/2) dry; weak very fine granular structure; friable; many fine roots; medium acid; clear wavy boundary.

Bt1—22 to 26 inches; dark yellowish brown (10YR 4/4) silty clay loam (29 percent clay); weak very fine and fine subangular blocky structure; friable; thin discontinuous clay films; common fine roots; slightly acid; gradual wavy boundary.

Bt2—26 to 32 inches; dark yellowish brown (10YR 4/4) silty clay loam (33 percent clay); weak fine subangular blocky structure; friable; very thin nearly continuous clay films; few very fine roots; slightly acid; gradual wavy boundary.

Bt3—32 to 38 inches; dark yellowish brown (10YR 4/4) silty clay loam (33 percent clay); weak fine prismatic structure parting to weak medium subangular blocky; friable; very thin nearly continuous clay films; few very fine roots; slightly acid; clear smooth boundary.

BC—38 to 50 inches; yellowish brown (10YR 5/4) silty clay loam (29 percent clay); weak medium prismatic structure parting to weak medium subangular blocky; friable; very thin patchy clay films on vertical faces of peds; slightly acid; clear wavy boundary.

2C1—50 to 56 inches; brown (10YR 5/3) sand (5 percent clay); single grained; few pebbles; slightly acid; gradual wavy boundary.

2C2—56 to 60 inches; pale brown (10YR 6/3) sand; single grained; loose; few pebbles; slightly acid.

The thickness of the solum ranges from 36 to 60 inches. The thickness of the mollic epipedon ranges from 18 to 24 inches.

The A horizon has value of 2 or 3 and chroma of 1 to 3. It is medium acid to neutral. The Bt horizon has value of 4 or 5 and chroma of 3 or 4. It is slightly acid to medium acid. The content of clay is 24 to 34 percent in the finest textured part of this horizon. The 2C horizon has value of 4 or 5 and chroma of 3 to 6.

Zook Series

The Zook series consists of poorly drained, slowly permeable soils on flood plains. These soils formed in silty and clayey alluvium. The native vegetation was prairie grasses. Slopes range from 0 to 2 percent.

Typical pedon of Zook silty clay, 0 to 2 percent slopes, in an area of cropland; 1,600 feet east and 63 feet north of the center of sec. 24, T. 75 N., R. 3 W.

Ap—0 to 8 inches; black (10YR 2/1) silty clay (42 percent clay), very dark gray (10YR 3/1) dry; moderate fine granular structure; firm; few fine roots; slightly acid; abrupt smooth boundary.

A1—8 to 26 inches; black (10YR 2/1) silty clay (44 percent clay), very dark gray (10YR 3/1) dry; black (N 2/0) coatings on faces of peds; moderate very fine subangular blocky structure; firm; few fine roots; slightly acid; gradual smooth boundary.

A2—26 to 43 inches; black (10YR 2/1) silty clay (41 percent clay), very dark gray (10YR 3/1) dry; few fine distinct brown (7.5YR 4/4) mottles; moderate fine prismatic structure parting to moderate fine and very fine subangular blocky; firm; slightly acid; gradual smooth boundary.

A3—43 to 51 inches; black (10YR 2/1) silty clay (40 percent clay); common moderate distinct very dark grayish brown (2.5Y 3/2) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure parting to moderate fine and very fine subangular blocky; firm; few strong brown (7.5YR 5/6) concretions (manganese oxide); slightly acid; clear smooth boundary.

Bg—51 to 60 inches; dark gray (10YR 4/1) silty clay loam (38 percent clay); very dark gray (10YR 3/1) coatings on faces of peds; common medium distinct very dark grayish brown (2.5Y 3/2) and many medium distinct strong brown (7.5YR 5/8) mottles; moderate fine prismatic structure parting to moderate fine subangular blocky; firm; few black (10YR 2/1) fillings in root channels; slightly acid.

The thickness of the solum ranges from 36 to 64 inches. The thickness of the mollic epipedon ranges from 36 to 51 inches.

The A horizon has value of 2 or 3 and chroma of 0 or 1. The A and Bg horizons are neutral or slightly acid.

The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 to 5, and chroma of 2 or less. It is silty clay or silty clay loam. The content of clay in this horizon is 38 to 46 percent.

Formation of the Soils

This section relates the major factors of soil formation to the soils in Louisa County. It also describes the processes of soil formation.

Factors of Soil Formation

Soil forms through processes that act on deposited or accumulated geologic material. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material, the climate under which the soil material has accumulated and existed since accumulation, the vegetation under which the soil formed, the relief, and the length of time that the forces of soil formation have acted on the soil material (*6*). Human activities also affect soil formation.

Climate and vegetation are the active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and rock material and slowly change it into a natural body that has genetically related horizons. The effects of climate and vegetation are conditioned by relief. The parent material affects the kind of soil profile that forms and, in extreme cases, determines it almost entirely. Finally, time is needed for transformation of the parent material into a soil. A long period generally is needed for the formation of distinct horizons. The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect on any one factor unless conditions are specified for the others.

Parent Material

The soils in Louisa County formed in various kinds of geologic material. In order of importance, these are loess, glacial till, alluvium, sandy eolian material, and material weathered from limestone bedrock. Various geologic depositions and subsequent erosion by streams resulted in the formation of a landscape characterized by broad, stable ridgetops. Soils that formed in loess are on these ridgetops. The gently sloping to very steep soils on side slopes formed in loess, glacial till, and material weathered from limestone. The soils on the bottom land and stream terraces along the Mississippi River and in other large and small stream and river valleys formed in alluvium. Some of the soils on stream benches formed in sandy eolian material or water-laid sandy material that was reworked by the wind.

Loess.—This is wind-deposited material that consists largely of silt particles and smaller amounts of clay and sand. It was deposited during the Wisconsin Glaciation, about 29,000 to 14,000 years ago (*5*). The wind probably carried much of the loess from the flood plains along the Missouri River, in the western part of Iowa; from the flood plains along the Mississippi River; and from areas along smaller rivers. The thickness of the loess and its content of clay are related to the distance from the source.

The loess is as much as 15 feet thick on the bluffs near the valley of the Mississippi River and thins out from the valley to the west. In much of the county, it is about 8 to 12 feet thick on nearly level, stable divides. It is thinner on side slopes. On the lower parts of the side slopes, glacial till is exposed. Most of the soils on uplands formed in loess. Examples are Clinton, Mahaska, and Fayette soils.

Glacial till.—The major Pleistocene deposits of pre-Wisconsin glacial drift in Louisa County are Nebraskan, Kansan, and Illinoian tills (*10*). The Nebraskan and Kansan glaciers moved across the entire county from the north and west. The Illinoian glacier moved through northern Illinois, entering Louisa County from the east. It covered the eastern two-thirds of the county. The Nebraskan till was presumably incorporated with the later Kansan glacial till (*7*). The Kansan till forms an extensive part of the landscape in the western third of the county, cropping out of the loess on side slopes. Kansan drift is buried by Illinoian drift in the eastern two-thirds of the county. It is evident in a few road cuts near the bluffs along the Mississippi River.

Soils formed on the Kansan and Illinoian till plains during the Yarmouth and Sangamon interglacial ages, before the loess was deposited. On nearly level interstream divides, the soils were strongly weathered, were thick, grayish, and plastic, and had a high content of clay. They are now buried soils that are several feet thick and are very slowly permeable. Ashgrove and Rinda soils formed in these paleosols. They are common throughout the county.

During the Late Sangamon period, geologic erosion cut below the Yarmouth-Sangamon or Sangamon paleosols in the Illinoian or Kansan till. The paleosols that formed during this period are commonly reddish and generally are thinner and not so high in clay content as the Yarmouth-Sangamon and Sangamon paleosols.

Material that formed during this period is exposed on narrow nose slopes and side slopes of the slightly lower interfluves. Keswick soils formed in this paleosol.

The glacial till and paleosols were covered by windblown loess during the Wisconsin Glaciation. Geological erosion removed the loess from many slopes, however, and exposed strongly eroded, weathered paleosols. In some areas, the paleosols have been beveled or truncated and only the lower part of the strongly weathered material remains. In other areas erosion removed all of the paleosols and exposed till that is only slightly weathered. Gara and Lindley soils formed in the slightly weathered glacial till.

The upper part of the Illinoian till generally has a lower density than the basal part and is less firm and more stratified (*4*). These differences have a direct effect on the bearing capacity, permeability, and consolidation characteristics of the till. These characteristics and the grayish, clayey paleosol, which causes water to move laterally between the Kansan and Illinoian tills, can result in minor landslides and slumps in areas of the steep and very steep Lindley soils. These characteristics also result in problems with slope stability in shallow excavations and in water-retention structures, such as ponds and lagoons.

Alluvium.—This is water-transported sediment that has been deposited along rivers and streams and on stream terraces. Its texture varies widely because of differences in the material from which the alluvium was derived and the manner in which it was deposited. In Louisa County the main sources of alluvium are loess, glacial till, and sediment deposited by the Mississippi, Iowa, and Cedar Rivers.

Some of the alluvial material has been transported only a short distance. This is called local alluvium. The Ely and Olmitz soils on foot slopes and alluvial fans formed in this local alluvium.

Alluvium is deposited as rivers and streams overflow their channels. The coarser or larger particles generally are deposited closer to the stream channel or in and along the path of the main current of the overflowing stream. The finer particles are deposited in the areas farther away, where the floodwater has little or no current. Klum soils formed in stratified, sandy and silty alluvium. Nodaway soils formed in stratified, silty recent alluvium. Lawson soils formed in alluvium that is darker and slightly finer textured than the alluvium in which Nodaway soils formed. They generally are farther from the stream channel.

The soils on the bottom land and terraces along the Mississippi, Cedar, and Iowa Rivers formed in alluvium having a wide variety of textures. The soils on the river bottoms generally are underlain by sandy alluvium at varying depths. Titus and Zook soils formed in fine textured alluvium, whereas Colo soils formed in alluvium that is not quite so fine textured. Coppock and Rowley soils formed in medium textured and moderately fine textured alluvium on terraces. The soils along the Mississippi River occur in a very complex pattern because the current of the river varied when it deposited the alluvial material. Some of the low areas are old channels or lakes that have been drained.

Limestone residuum.—Material weathered from limestone bedrock is the oldest parent material in Louisa County. The limestone bedrock is at or near the surface in various parts of the county, especially the southern and west-central parts. Most of these areas are at or near the base of the steeper slopes. The limestone bedrock is interbedded with shale in some areas. It is exposed in quarries and in some road cuts. Many streams are cutting into the bedrock. Nordness soils formed in limestone residuum.

Sandy eolian material.—This material consists mainly of fine quartz sand. It generally is on stream terraces. In some areas it was partly deposited by water, but the top 2 or 3 feet may have been reworked by the wind. One area of this material is known as the Great Sand Mound. It is in the northeastern part of the county, next to the Mississippi River. It makes up about 1.5 square miles. It is probably a remnant of an old stream terrace, but the material has been thoroughly reworked by the wind. Dickinson and Sparta soils formed in this eolian material.

Climate

The soils in Louisa County formed under the influence of a midcontinental, subhumid climate for at least 3,000 years (*9, 11*). Between 30,000 and 11,000 years ago, a cooler, moist climate favored the growth of coniferous forest vegetation. As the climate warmed, deciduous forest invaded and persisted until about 9,000 years ago. Since that time, the climate has been characterized by further warming and drying. Under these climatic conditions, the dominant vegetation has been mixed prairie grasses and deciduous forest.

The general climate has had an important overall influence on the characteristics of the soils but has not caused major differences among them. The influence of the general climate in a region is modified by local conditions. For example, soils on south-facing slopes formed under a microclimate that is warmer and drier than that of the soils in nearby areas. Also, the low lying, poorly drained soils on bottom land formed under a microclimate that is wetter and colder than that of most of the surrounding soils. These local conditions account for some of the differences among the soils in the county.

Changes in temperature activate the weathering of the parent material by water and air. As the parent material weathers, changes caused by physical and chemical actions take place. Rainfall affects the amount of leaching in the soil and the kinds of plants on the soil. Temperature and other climatic factors indirectly affect

soil formation through their effect on the plant and animal life on and in the soil.

Vegetation

Many changes in the climate and vegetation took place in Iowa during the postglacial period (*9*). Forest vegetation dominated by spruce grew on the soils until about 11,000 years ago. It was replaced by deciduous forest, which was dominant until about 9,000 years ago. Then, prairie grasses began to dominate. For the past 9,000 years, the soils in the county probably have been influenced by both prairie grasses and deciduous trees. Big bluestem and little bluestem were the main prairie grasses. Oak, hickory, ash, elm, and maple were the main trees.

The vegetation probably changed while some soils were forming. The morphology of Downs, Gara, Givin, and Ladoga soils, for example, reflects the influence of both trees and grasses. Clinton, Fayette, Keomah, and Lindley soils formed under forest vegetation (*8*). Mahaska, Muscatine, Otley, Taintor, and Zook soils formed under grasses.

The soils that formed under forest vegetation generally have a surface layer that is lighter colored and thinner than that of the soils that formed under grasses. Also, they are more acid and have a lower content of organic matter. The soils that formed under mixed grasses and trees have properties that are intermediate between those of soils that formed only under grasses and those of soils that formed only under trees.

Relief

Relief affects the formation of soils mainly through its effect on drainage, runoff, the depth to the water table, and erosion. The soils in Louisa County range from level to very steep.

A difference in slope is the main reason for the differing properties among some of the soils in the county. The influence of relief is evident in the color, the thickness of the solum, and the development of horizons. Taintor and Otley soils both formed in loess under prairie grasses, but they are in different positions on the landscape. The nearly level, poorly drained Taintor soils are in areas where water runs off the surface slowly. The gently sloping and moderately sloping, moderately well drained Otley soils are in areas where some of the rainfall runs off the surface and some percolates through the soils, evaporates, or is used by plants. The Taintor soils have a high water table during part of the year. The high water table results in a grayish color in the subsoil. The Otley soils, which do not have a seasonal high water table, have a browner subsoil.

Slope affects runoff and the amount of moisture available to plants. A scarcity of moisture restricts the growth of some types of vegetation. As a result, it affects the content of organic matter in the surface layer.

Time

The length of time that the soil material is acted on by soil-forming processes affects the kind of soil that forms. The older soils have strongly expressed genetic horizons. The younger soils have only weakly expressed horizons. Some soils on flood plains show little or no evidence of soil formation because they have not been in place long enough for the development of distinct horizons. Nodaway soils are an example.

An older soil generally has a higher content of clay in the subsoil than a younger soil that formed in a similar kind of parent material. As a soil forms, clay is moved from the surface layer to the subsoil. This transfer is more evident in a nearly level soil than in a more sloping soil. In the more sloping soil, erosion may remove material from the surface before a thick profile can form. Lindley and Gara soils are examples.

Human Activities

Important changes take place in the soil after it is cultivated. Changes caused by water erosion generally are the most significant. In many of the cultivated areas in the county, particularly the gently rolling and strongly sloping ones, part of the original surface layer has been lost through sheet erosion.

In many intensively cultivated areas, the granular structure that was apparent when the grassland was undisturbed is no longer evident. In these areas the surface layer tends to bake and harden when it dries. Fine textured soils that have been plowed when too wet tend to puddle and are characterized by a slower rate of water infiltration than similar soils in undisturbed areas.

Management practices have increased the productivity of some soils and reclaimed areas that are otherwise not suitable for crops. Because of drainage ditches, diversions, dikes, and levees, large areas of bottom land are suitable for cultivation. A drainage system has greatly improved the suitability of broad areas of the nearly level Taintor and Kalona soils for cultivation. Applications of commercial fertilizer have counteracted deficiencies in plant nutrients. As a result of these applications, some soils are more productive than they were in their natural state.

Processes of Soil Formation

Horizon differentiation is the result of four basic processes. These are additions, removals, transfers, and transformations (*12*). Each of these affects many substances in the soils, such as organic matter, soluble salts, carbonates, iron oxides, and clay minerals. The changes brought about by these processes help to determine the ultimate nature of the soil profile.

The accumulation of organic matter is an early phase in the formation of most soils. The content of organic matter ranges from high to very low in the A horizon of

the soils in Louisa County. It is low in the thin A horizon of the Clinton and Fayette soils and high in the thick A horizon of the Zook and Colo soils. In some soils it is low because erosion has removed part of the A horizon.

The removal of substances from parts of the profile is important in the development of soil horizons in Louisa County. The downward movement of calcium carbonates and bases is an example. Free carbonates have been leached from the upper part of nearly all of the soils in the county. Exceptions are some very young alluvial soils. Some soils are so strongly leached that they are strongly acid or very strongly acid in the subsoil.

A number of transfers from one horizon to another are evident in the soils of the county. Phosphorus, for example, is removed from the subsoil by plant roots and transferred to the parts of the plant growing above the ground. It is then returned to the surface layer in the plant residue. This process affects the form and distribution of the phosphorus in the profile.

The translocation of silicate clay minerals has an important effect on horizon development. The clay minerals are carried downward in suspension by percolating water from the A horizon. They accumulate in the B horizon as fillings in pores and root channels and as clay films on the faces of peds. This process has affected many of the soils in the county. In other soils, the clay content of the A horizon is not markedly different from that of the B horizon and other evidence of clay movement is minimal.

Transformations are physical and chemical. The weathering of soil particles to smaller sizes by freezing and thawing is an example of a physical transformation. The reduction of iron is an example of a chemical transformation. This process is called gleying. It occurs when the soil is saturated for long periods. It is evidenced by ferrous iron and gray colors in the soil. It is a characteristic of poorly drained soils, such as Taintor soils. Reductive extractable iron, or free iron, generally is not so evident in somewhat poorly drained soils, such as Mahaska soils (*15*).

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse textured soil. Sand or loamy sand.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow.

Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified

organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Paleosol. A buried soil or formerly buried soil, especially one that formed during an interglacial period.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.
Substratum. The part of the soil below the solum.
Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.
Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."
Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.
Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.
Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.
Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.
Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."
Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.
Till plain. An extensive flat to undulating area underlain by glacial till.
Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.
Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.
Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.
Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-81 at Columbus Junction, Iowa)

Month	Temperature: Average daily maximum	Temperature: Average daily minimum	Temperature: Average	Temperature: 2 years in 10 will have-- Maximum temperature higher than--	Temperature: 2 years in 10 will have-- Minimum temperature lower than--	Temperature: Average number of growing degree days*	Precipitation: Average	Precipitation: 2 years in 10 will have-- Less than--	Precipitation: 2 years in 10 will have-- More than--	Precipitation: Average number of days with 0.10 inch or more	Precipitation: Average snowfall
	^oF	^oF	^oF	^oF	^oF	Units	In	In	In		In
January----	29.9	11.1	20.5	60	-20	0	1.33	0.46	2.03	3	8.9
February---	35.8	17.1	26.5	62	-16	0	1.10	.48	1.63	4	7.5
March------	46.9	26.9	36.9	78	0	29	2.57	1.04	3.86	6	7.4
April------	63.3	40.3	51.8	88	20	130	3.92	2.17	5.46	8	1.4
May--------	74.3	50.2	62.3	92	31	391	4.21	2.40	5.81	8	.0
June-------	83.0	59.5	71.3	96	42	639	4.45	2.67	6.04	7	.0
July-------	86.8	63.5	75.2	99	47	781	4.36	2.54	5.98	7	.0
August-----	84.8	61.3	73.1	98	45	716	4.09	1.72	6.09	6	.0
September--	77.8	52.9	65.4	95	32	462	3.91	1.10	6.16	6	.0
October----	66.9	42.1	54.5	89	20	208	3.15	.91	4.94	5	.5
November---	49.8	29.9	39.9	74	5	19	2.02	.71	3.10	4	3.4
December---	36.0	18.6	27.3	63	-14	0	1.77	.78	2.61	4	8.0
Yearly:											
Average--	61.3	39.5	50.4	---	---	---	---	---	---	---	---
Extreme--	---	---	---	99	-22	---	---	---	---	---	---
Total----	---	---	---	---	---	3,375	36.88	29.86	43.10	68	37.1

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-81 at Columbus Junction, Iowa)

Probability	Temperature 24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 18	Apr. 24	May 12
2 years in 10 later than--	Apr. 13	Apr. 20	May 7
5 years in 10 later than--	Apr. 4	Apr. 11	Apr. 28
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 15	Oct. 7	Sept. 23
2 years in 10 earlier than--	Oct. 20	Oct. 11	Sept. 28
5 years in 10 earlier than--	Oct. 30	Oct. 21	Oct. 8

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-81 at Columbus Junction, Iowa)

Probability	Daily minimum temperature during growing season: Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	189	172	146
8 years in 10	196	179	152
5 years in 10	208	192	162
2 years in 10	220	205	173
1 year in 10	227	212	178

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
11B	Colo-Ely silty clay loams, 0 to 5 percent slopes	5,600	2.1
41	Sparta sand, 0 to 2 percent slopes	3,685	1.4
41B	Sparta sand, 2 to 5 percent slopes	2,885	1.1
41C	Sparta sand, 5 to 9 percent slopes	1,640	0.6
63B	Chelsea loamy fine sand, 1 to 5 percent slopes	875	0.3
63C	Chelsea loamy fine sand, 5 to 9 percent slopes	435	0.2
63E	Chelsea loamy fine sand, 12 to 18 percent slopes	610	0.2
65D2	Lindley loam, 9 to 14 percent slopes, moderately eroded	540	0.2
65E	Lindley loam, 14 to 18 percent slopes	6,040	2.3
65E2	Lindley loam, 14 to 18 percent slopes, moderately eroded	1,185	0.4
65F	Lindley loam, 18 to 25 percent slopes	7,910	3.0
65G	Lindley loam, 25 to 40 percent slopes	2,730	1.0
74	Rubio silt loam, 0 to 2 percent slopes	430	0.2
75	Givin silt loam, 0 to 2 percent slopes	3,805	1.4
75B	Givin silt loam, 2 to 5 percent slopes	600	0.2
76B	Ladoga silt loam, 2 to 5 percent slopes	3,225	1.2
76C	Ladoga silt loam, 5 to 9 percent slopes	365	0.1
76C2	Ladoga silt loam, 5 to 9 percent slopes, moderately eroded	3,145	1.2
76D2	Ladoga silt loam, 9 to 14 percent slopes, moderately eroded	535	0.2
80B	Clinton silt loam, 2 to 5 percent slopes	10,605	4.0
80C	Clinton silt loam, 5 to 9 percent slopes	6,315	2.4
80C2	Clinton silt loam, 5 to 9 percent slopes, moderately eroded	8,880	3.3
80D	Clinton silt loam, 9 to 14 percent slopes	3,315	1.2
80D2	Clinton silt loam, 9 to 14 percent slopes, moderately eroded	5,070	1.9
80D3	Clinton silty clay loam, 9 to 14 percent slopes, severely eroded	230	0.1
110B	Lamont fine sandy loam, 2 to 5 percent slopes	325	0.1
118	Garwin silty clay loam, 0 to 2 percent slopes	1,510	0.6
119	Muscatine silty clay loam, 0 to 2 percent slopes	3,115	1.2
120B	Tama silty clay loam, 2 to 5 percent slopes	2,745	1.0
120C2	Tama silty clay loam, 5 to 9 percent slopes, moderately eroded	500	0.2
122	Sperry silt loam, 0 to 1 percent slopes	445	0.2
127	Wiota silt loam, sandy substratum, 0 to 2 percent slopes	815	0.3
127B	Wiota silt loam, sandy substratum, 2 to 5 percent slopes	670	0.3
133	Colo silty clay loam, 0 to 2 percent slopes	4,560	1.7
134	Zook silty clay, 0 to 2 percent slopes	2,930	1.1
135	Coland clay loam, 0 to 2 percent slopes	2,045	0.8
139	Perks loamy sand, 0 to 3 percent slopes	3,215	1.2
140	Sparta loamy sand, 0 to 2 percent slopes	1,185	0.4
141	Watseka loamy fine sand, 0 to 2 percent slopes	1,090	0.4
152	Marshan clay loam, 0 to 2 percent slopes	1,430	0.5
160	Walford silt loam, 0 to 1 percent slopes	1,815	0.7
162B	Downs silt loam, 2 to 5 percent slopes	1,715	0.6
162C	Downs silt loam, 5 to 9 percent slopes	200	0.1
162C2	Downs silt loam, 5 to 9 percent slopes, moderately eroded	1,520	0.6
162D2	Downs silt loam, 9 to 14 percent slopes, moderately eroded	460	0.2
163B	Fayette silt loam, 2 to 5 percent slopes	4,155	1.6
163C	Fayette silt loam, 5 to 9 percent slopes	1,255	0.5
163C2	Fayette silt loam, 5 to 9 percent slopes, moderately eroded	2,265	0.8
163D	Fayette silt loam, 9 to 14 percent slopes	1,275	0.5
163D2	Fayette silt loam, 9 to 14 percent slopes, moderately eroded	1,080	0.4
163E	Fayette silt loam, 14 to 18 percent slopes	800	0.3
163E2	Fayette silt loam, 14 to 18 percent slopes, moderately eroded	250	0.1
163F	Fayette silt loam, 18 to 25 percent slopes	390	0.1
164	Traer silt loam, 0 to 2 percent slopes	500	0.2
165	Stronghurst silt loam, 0 to 2 percent slopes	2,515	0.9
173	Hoopeston fine sandy loam, 0 to 2 percent slopes	1,625	0.6
174	Bolan loam, 0 to 2 percent slopes	1,905	0.7
174B	Bolan loam, 2 to 5 percent slopes	370	0.1
175	Dickinson fine sandy loam, 0 to 2 percent slopes	1,470	0.5
175B	Dickinson fine sandy loam, 2 to 5 percent slopes	560	0.2
179D2	Gara loam, 9 to 14 percent slopes, moderately eroded	910	0.3
180	Keomah silt loam, 0 to 2 percent slopes	1,855	0.7
208	Klum fine sandy loam, 0 to 2 percent slopes	2,025	0.8
220	Nodaway silt loam, 0 to 2 percent slopes	2,685	1.0
223C2	Rinda silty clay loam, 5 to 9 percent slopes, moderately eroded	390	0.1

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
223D2	Rinda silty clay loam, 9 to 14 percent slopes, moderately eroded	875	0.3
273B	Olmitz loam, 2 to 5 percent slopes	385	0.1
273C	Olmitz loam, 5 to 9 percent slopes	395	0.1
279	Taintor silty clay loam, 0 to 2 percent slopes	8,090	3.0
280	Mahaska silty clay loam, 0 to 2 percent slopes	8,315	3.1
280B	Mahaska silty clay loam, 2 to 5 percent slopes	2,495	0.9
281B	Otley silty clay loam, 2 to 5 percent slopes	2,595	1.0
281C2	Otley silty clay loam, 5 to 9 percent slopes, moderately eroded	1,260	0.5
291	Atterberry silt loam, 0 to 2 percent slopes	4,500	1.7
293C	Chelsea-Lamont-Fayette complex, 5 to 9 percent slopes	345	0.1
293E	Chelsea-Lamont-Fayette complex, 9 to 18 percent slopes	295	0.1
352B	Whittier silt loam, 2 to 5 percent slopes	405	0.2
352C2	Whittier silt loam, 5 to 9 percent slopes, moderately eroded	205	0.1
352D2	Whittier silt loam, 9 to 14 percent slopes, moderately eroded	270	0.1
353C2	Tell silt loam, 5 to 9 percent slopes, moderately eroded	245	0.1
353D2	Tell silt loam, 9 to 14 percent slopes, moderately eroded	500	0.2
354	Aquolls, ponded	2,355	0.9
424E	Lindley-Keswick loams, 14 to 18 percent slopes	360	0.1
424E2	Lindley-Keswick loams, 14 to 18 percent slopes, moderately eroded	580	0.2
425D2	Keswick loam, 9 to 14 percent slopes, moderately eroded	585	0.2
428B	Ely silty clay loam, 2 to 5 percent slopes	545	0.2
430	Ackmore silt loam, 0 to 2 percent slopes	1,215	0.5
453	Tuskeego silt loam, 0 to 2 percent slopes	785	0.3
473	Gilford fine sandy loam, 0 to 2 percent slopes	770	0.3
484	Lawson silt loam, 0 to 2 percent slopes	1,620	0.6
499G	Nordness silt loam, 18 to 40 percent slopes	990	0.4
520	Coppock silt loam, 0 to 2 percent slopes	1,680	0.6
520B	Coppock silt loam, 2 to 5 percent slopes	470	0.2
539	Perks sandy loam, 0 to 3 percent slopes	1,580	0.6
570B	Nira silty clay loam, 2 to 5 percent slopes	1,625	0.6
570C2	Nira silty clay loam, 5 to 9 percent slopes, moderately eroded	1,400	0.5
571B	Hedrick silt loam, 2 to 5 percent slopes	1,735	0.6
571C2	Hedrick silt loam, 5 to 9 percent slopes, moderately eroded	4,335	1.6
571D2	Hedrick silt loam, 9 to 14 percent slopes, moderately eroded	200	0.1
572B	Inton silt loam, 2 to 5 percent slopes	685	0.3
572C2	Inton silt loam, 5 to 9 percent slopes, moderately eroded	2,640	1.0
572C3	Inton silty clay loam, 5 to 9 percent slopes, severely eroded	685	0.3
572D2	Inton silt loam, 9 to 14 percent slopes, moderately eroded	535	0.2
572D3	Inton silty clay loam, 9 to 14 percent slopes, severely eroded	225	0.1
573	Hoopeston loam, 0 to 2 percent slopes	2,270	0.8
653	Tuskeego silt loam, sandy substratum, 0 to 2 percent slopes	575	0.2
684	Elrick sandy loam, 0 to 2 percent slopes	1,630	0.6
688	Koszta silt loam, 0 to 2 percent slopes	1,620	0.6
759	Fruitfield sand, 0 to 3 percent slopes	1,740	0.7
779	Kalona silty clay loam, 0 to 1 percent slopes	495	0.2
793	Bertrand silt loam, 0 to 2 percent slopes	720	0.3
793B	Bertrand silt loam, 2 to 5 percent slopes	700	0.3
795D2	Ashgrove silty clay loam, 9 to 14 percent slopes, moderately eroded	760	0.3
826	Rowley silt loam, 0 to 2 percent slopes	3,080	1.2
834	Titus silty clay loam, 0 to 2 percent slopes	2,190	0.8
893D2	Gara-Rinda complex, 9 to 14 percent slopes, moderately eroded	595	0.2
916B	Downs silt loam, sandy substratum, 2 to 5 percent slopes	1,485	0.6
916C2	Downs silt loam, sandy substratum, 5 to 9 percent slopes, moderately eroded	985	0.4
917B	Fayette silt loam, sandy substratum, 2 to 5 percent slopes	265	0.1
917C2	Fayette silt loam, sandy substratum, 5 to 9 percent slopes, moderately eroded	525	0.2
925	Toolesboro loam, 0 to 2 percent slopes	1,465	0.5
960	Shaffton loam, 0 to 2 percent slopes	8,625	3.2
961	Ambraw loam, 0 to 2 percent slopes	8,015	3.0
1058E	Douds-Lindley loams, 14 to 18 percent slopes	300	0.1
1058F	Douds-Lindley loams, 18 to 25 percent slopes	350	0.1
1058G	Douds-Lindley loams, 25 to 40 percent slopes	1,480	0.6
1220	Nodaway silt loam, channeled, 0 to 2 percent slopes	565	0.2
1484	Lawson silt loam, channeled, 0 to 2 percent slopes	1,460	0.5
1539	Coland-Perks-Lawson complex, frequently flooded, 0 to 2 percent slopes	3,845	1.4
1730B	Nodaway-Klum complex, channeled, 0 to 5 percent slopes	890	0.3

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
3133	Colo silty clay loam, rarely flooded, 0 to 2 percent slopes	1,580	0.6
3133+	Colo loamy sand, overwash, 0 to 2 percent slopes	455	0.2
3539	Perks sandy loam, rarely flooded, 0 to 3 percent slopes	540	0.2
3834	Titus silty clay loam, rarely flooded, 0 to 2 percent slopes	4,155	1.6
3960	Shaffton loam, rarely flooded, 0 to 2 percent slopes	2,000	0.7
3961	Ambraw loam, rarely flooded, 0 to 2 percent slopes	2,380	0.9
5010	Pits, sand and gravel	75	*
5030	Pits, limestone quarry	105	*
	Water	9,600	3.6
	Total	267,520	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
11B	Colo-Ely silty clay loams, 0 to 5 percent slopes (where drained)
74	Rubio silt loam, 0 to 2 percent slopes (where drained)
75	Givin silt loam, 0 to 2 percent slopes
75B	Givin silt loam, 2 to 5 percent slopes
76B	Ladoga silt loam, 2 to 5 percent slopes
80B	Clinton silt loam, 2 to 5 percent slopes
110B	Lamont fine sandy loam, 2 to 5 percent slopes
118	Garwin silty clay loam, 0 to 2 percent slopes (where drained)
119	Muscatine silty clay loam, 0 to 2 percent slopes
120B	Tama silty clay loam, 2 to 5 percent slopes
122	Sperry silt loam, 0 to 1 percent slopes (where drained)
127	Wiota silt loam, sandy substratum, 0 to 2 percent slopes
127B	Wiota silt loam, sandy substratum, 2 to 5 percent slopes
133	Colo silty clay loam, 0 to 2 percent slopes (where drained)
134	Zook silty clay, 0 to 2 percent slopes (where drained)
135	Coland clay loam, 0 to 2 percent slopes (where drained)
152	Marshan clay loam, 0 to 2 percent slopes (where drained)
160	Walford silt loam, 0 to 1 percent slopes (where drained)
162B	Downs silt loam, 2 to 5 percent slopes
163B	Fayette silt loam, 2 to 5 percent slopes
164	Traer silt loam, 0 to 2 percent slopes (where drained)
165	Stronghurst silt loam, 0 to 2 percent slopes (where drained)
173	Hoopeston fine sandy loam, 0 to 2 percent slopes
174	Bolan loam, 0 to 2 percent slopes
174B	Bolan loam, 2 to 5 percent slopes
175	Dickinson fine sandy loam, 0 to 2 percent slopes
175B	Dickinson fine sandy loam, 2 to 5 percent slopes
180	Keomah silt loam, 0 to 2 percent slopes (where drained)
208	Klum fine sandy loam, 0 to 2 percent slopes (where protected from flooding or not frequently flooded during the growing season)
220	Nodaway silt loam, 0 to 2 percent slopes
273B	Olmitz loam, 2 to 5 percent slopes
279	Taintor silty clay loam, 0 to 2 percent slopes (where drained)
280	Mahaska silty clay loam, 0 to 2 percent slopes
280B	Mahaska silty clay loam, 2 to 5 percent slopes
281B	Otley silty clay loam, 2 to 5 percent slopes
291	Atterberry silt loam, 0 to 2 percent slopes (where drained)
352B	Whittier silt loam, 2 to 5 percent slopes
428B	Ely silty clay loam, 2 to 5 percent slopes
430	Ackmore silt loam, 0 to 2 percent slopes (where drained)
453	Tuskeego silt loam, 0 to 2 percent slopes (where drained)
473	Gilford fine sandy loam, 0 to 2 percent slopes (where drained)
484	Lawson silt loam, 0 to 2 percent slopes
520	Coppock silt loam, 0 to 2 percent slopes (where drained)
520B	Coppock silt loam, 2 to 5 percent slopes (where drained)
570B	Nira silty clay loam, 2 to 5 percent slopes
571B	Hedrick silt loam, 2 to 5 percent slopes
572B	Inton silt loam, 2 to 5 percent slopes
573	Hoopeston loam, 0 to 2 percent slopes
653	Tuskeego silt loam, sandy substratum, 0 to 2 percent slopes (where drained)
688	Koszta silt loam, 0 to 2 percent slopes
779	Kalona silty clay loam, 0 to 1 percent slopes (where drained)
793	Bertrand silt loam, 0 to 2 percent slopes
793B	Bertrand silt loam, 2 to 5 percent slopes
826	Rowley silt loam, 0 to 2 percent slopes
834	Titus silty clay loam, 0 to 2 percent slopes (where drained)
916B	Downs silt loam, sandy substratum, 2 to 5 percent slopes
917B	Fayette silt loam, sandy substratum, 2 to 5 percent slopes
925	Toolesboro loam, 0 to 2 percent slopes (where drained)
960	Shaffton loam, 0 to 2 percent slopes

TABLE 5.--PRIME FARMLAND--Continued

Map symbol	Soil name
961	Ambraw loam, 0 to 2 percent slopes (where drained)
3133	Colo silty clay loam, rarely flooded, 0 to 2 percent slopes (where drained)
3834	Titus silty clay loam, rarely flooded, 0 to 2 percent slopes (where drained)
3960	Shaffton loam, rarely flooded, 0 to 2 percent slopes
3961	Ambraw loam, rarely flooded, 0 to 2 percent slopes (where drained)

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Oats	Bromegrass-alfalfa hay	Kentucky bluegrass	Smooth bromegrass	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*	AUM*	AUM*
11B------------- Colo-Ely	IIw	143	48	86	4.9	4.1	6.2	7.6
41-------------- Sparta	IVs	71	23	43	3.0	2.8	4.2	4.5
41B------------- Sparta	IVs	68	21	41	2.8	2.5	4.0	4.3
41C------------- Sparta	IVs	59	18	35	2.5	2.1	3.6	3.9
63B------------- Chelsea	IVs	68	21	41	2.9	2.0	3.3	3.3
63C------------- Chelsea	IVs	63	19	38	2.6	1.8	3.0	3.0
63E------------- Chelsea	VIIs	---	---	---	1.9	1.1	2.1	2.1
65D2------------ Lindley	IVe	97	32	49	4.0	3.6	5.8	6.7
65E------------- Lindley	VIe	---	---	---	3.5	2.3	4.4	5.5
65E2------------ Lindley	VIe	---	---	---	3.3	1.6	3.0	3.9
65F, 65G-------- Lindley	VIIe	---	---	---	---	1.0	2.0	2.9
74-------------- Rubio	IIIw	138	46	76	4.1	3.8	5.7	6.6
75-------------- Givin	I	148	50	81	5.9	4.2	8.3	8.3
75B------------- Givin	IIe	145	49	80	5.8	4.2	8.1	8.1
76B------------- Ladoga	IIe	148	50	81	6.2	4.3	6.8	7.8
76C------------- Ladoga	IIIe	143	48	79	6.0	4.0	6.5	7.5
76C2------------ Ladoga	IIIe	139	47	76	5.8	3.9	6.3	7.3
76D2------------ Ladoga	IIIe	130	44	72	5.5	3.7	5.7	6.6
80B------------- Clinton	IIe	139	47	76	5.8	4.0	6.4	7.5

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Oats	Bromegrass-alfalfa hay	Kentucky bluegrass	Smooth bromegrass	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*	AUM*	AUM*
80C------------ Clinton	IIIe	134	45	74	5.6	3.8	6.1	7.1
80C2----------- Clinton	IIIe	130	44	72	5.5	3.6	6.0	7.0
80D------------ Clinton	IIIe	125	42	69	5.2	3.6	5.6	6.5
80D2----------- Clinton	IIIe	121	41	67	5.1	3.5	5.3	6.3
80D3----------- Clinton	IVe	113	38	62	4.8	2.8	5.0	6.0
110B----------- Lamont	IIIe	91	28	55	3.8	2.3	3.5	4.1
118------------ Garwin	IIw	167	56	100	5.0	4.1	7.5	8.3
119------------ Muscatine	I	170	57	102	6.8	4.2	7.8	9.1
120B----------- Tama	IIe	167	56	100	7.0	4.2	7.5	8.6
120C2---------- Tama	IIIe	158	53	95	6.6	3.8	7.0	8.1
122------------ Sperry	IIIw	124	42	68	3.7	3.6	5.1	---
127------------ Wiota	I	148	50	89	6.2	4.0	7.1	8.3
127B----------- Wiota	IIe	145	49	87	6.1	4.0	7.0	8.3
133------------ Colo	IIw	136	46	82	4.2	4.2	5.5	7.0
134------------ Zook	IIIw	117	39	70	3.4	3.8	3.7	---
135------------ Coland	IIw	136	44	95	4.1	4.1	6.0	7.6
139------------ Perks	IVs	50	17	27	2.1	1.3	2.0	2.5
140------------ Sparta	IVs	80	25	50	3.4	2.4	4.4	4.5
141------------ Watseka	IIIs	72	23	50	2.9	2.7	4.1	4.4
152------------ Marshan	IIw	126	38	76	3.8	4.1	5.3	6.2

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Oats	Bromegrass-alfalfa hay	Kentucky bluegrass	Smooth bromegrass	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*	AUM*	AUM*
160------------- Walford	IIIw	128	43	77	3.8	3.0	5.1	5.8
162B------------ Downs	IIe	158	53	95	6.6	4.1	7.1	8.3
162C------------ Downs	IIIe	153	51	92	6.4	4.0	6.8	8.1
162C2----------- Downs	IIIe	149	50	89	6.3	3.8	6.6	7.8
162D2----------- Downs	IIIe	140	47	84	5.9	3.6	6.1	7.1
163B------------ Fayette	IIe	149	50	89	6.3	4.0	6.6	7.8
163C------------ Fayette	IIIe	144	48	86	6.0	3.8	6.5	7.5
163C2----------- Fayette	IIIe	140	47	84	5.9	3.6	6.5	7.5
163D------------ Fayette	IIIe	135	45	81	5.7	3.6	6.0	7.0
163D2----------- Fayette	IIIe	131	44	79	5.5	3.5	5.8	6.6
163E------------ Fayette	IVe	118	40	71	5.0	3.3	5.0	5.8
163E2----------- Fayette	IVe	114	38	68	4.8	3.2	4.8	5.6
163F------------ Fayette	VIe	---	---	63	4.6	3.1	4.8	5.6
164------------- Traer	IIIw	119	40	71	3.6	3.3	4.8	5.3
165------------- Stronghurst	IIw	138	42	76	5.3	4.0	7.0	7.9
173------------- Hoopeston	IIs	105	33	70	4.1	2.1	4.2	4.4
174------------- Bolan	IIs	125	38	75	5.2	3.6	5.3	6.3
174B------------ Bolan	IIe	122	37	73	5.1	3.6	5.2	6.1
175------------- Dickinson	IIs	112	34	67	4.7	2.7	5.0	5.0
175B------------ Dickinson	IIe	109	33	65	4.6	2.7	4.8	5.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Oats	Bromegrass-alfalfa hay	Kentucky bluegrass	Smooth bromegrass	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*	AUM*	AUM*
179D2----------- Gara	IVe	106	36	53	4.5	2.5	4.5	5.1
180------------- Keomah	IIw	131	44	72	5.2	4.3	8.0	8.0
208------------- Klum	IIIw	88	29	48	3.7	2.1	3.8	4.8
220------------- Nodaway	IIw	153	51	92	6.4	4.0	6.5	7.6
223C2----------- Rinda	IVw	63	21	32	1.9	2.3	3.3	3.5
223D2----------- Rinda	IVe	57	19	29	1.7	1.7	2.5	2.8
273B------------ Olmitz	IIe	137	46	69	5.8	3.9	6.0	7.0
273C------------ Olmitz	IIIe	132	44	66	5.5	3.7	5.7	6.6
279------------- Taintor	IIw	155	52	85	4.7	4.2	7.0	7.8
280------------- Mahaska	I	165	55	91	6.6	4.5	7.5	8.6
280B------------ Mahaska	IIe	162	54	89	6.5	4.2	7.1	8.3
281B------------ Otley	IIe	157	53	86	6.6	4.3	7.1	8.3
281C2----------- Otley	IIIe	148	50	81	6.2	3.9	6.6	7.8
291------------- Atterberry	I	149	44	85	5.6	4.0	6.5	7.6
293C------------ Chelsea-Lamont-Fayette	IIIe	88	27	54	3.3	2.2	3.9	4.5
293E------------ Chelsea-Lamont-Fayette	VIe	---	---	---	3.0	1.9	3.4	3.8
352B------------ Whittier	IIe	133	45	80	5.6	3.3	5.0	5.8
352C2----------- Whittier	IIIe	124	42	74	5.2	2.8	4.5	5.3
352D2----------- Whittier	IVe	115	39	69	4.8	2.6	4.0	4.5
353C2----------- Tell	IIIe	115	39	69	4.8	3.1	4.6	5.5
353D2----------- Tell	IVe	106	36	64	4.4	2.7	4.3	5.2

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Oats	Bromegrass-alfalfa hay	Kentucky bluegrass	Smooth bromegrass	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*	AUM*	AUM*
354------------ Aquolls	VIIw	---	---	---	---	---	---	---
424E----------- Lindley-Keswick	VIe	---	---	---	1.9	3.2	2.8	3.3
424E2---------- Lindley-Keswick	VIe	---	---	---	1.6	3.0	2.5	2.9
425D2---------- Keswick	IVe	62	21	31	2.6	1.3	2.7	3.0
428B----------- Ely	IIe	159	53	95	6.4	4.0	7.5	8.8
430------------ Ackmore	IIw	141	47	85	4.2	3.8	6.3	7.5
453------------ Tuskeego	IIIw	105	35	58	3.2	3.3	4.3	5.5
473------------ Gilford	IIw	120	42	100	4.0	3.6	5.8	6.9
484------------ Lawson	IIw	157	53	94	6.3	4.6	6.7	7.8
499G----------- Nordness	VIIs	---	---	---	---	0.5	0.7	0.7
520------------ Coppock	IIw	121	41	61	3.6	3.3	4.7	6.1
520B----------- Coppock	IIw	118	40	59	3.5	3.3	4.3	6.0
539------------ Perks	IIIs	60	20	33	2.5	1.9	2.4	3.9
570B----------- Nira	IIe	152	51	84	6.4	4.5	6.8	8.0
570C2---------- Nira	IIIe	143	48	79	6.0	3.9	6.3	7.5
571B----------- Hedrick	IIe	137	46	75	5.8	4.0	6.6	7.6
571C2---------- Hedrick	IIIe	128	43	70	5.4	3.6	6.1	7.0
571D2---------- Hedrick	IIIe	119	40	65	5.0	3.4	5.7	6.5
572B----------- Inton	IIe	134	45	74	5.6	3.7	5.9	7.0
572C2---------- Inton	IIIe	125	42	69	5.2	3.3	5.5	6.5

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Oats	Bromegrass-alfalfa hay	Kentucky bluegrass	Smooth bromegrass	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*	AUM*	AUM*
572C3----------- Inton	IIIe	117	39	64	4.9	2.8	4.5	5.0
572D2----------- Inton	IIIe	116	39	64	4.9	3.2	4.8	5.8
572D3----------- Inton	IVe	108	36	59	4.5	2.4	4.5	4.7
573------------- Hoopeston	IIs	115	39	70	4.6	2.6	4.4	5.0
653------------- Tuskeego	IIIw	115	39	63	3.4	3.2	4.1	5.3
684------------- Elrick	IIIs	80	27	44	---	---	---	---
688------------- Koszta	I	154	52	92	6.2	3.7	6.5	7.5
759------------- Fruitfield	IVs	50	17	---	---	---	---	---
779------------- Kalona	IIw	152	51	84	4.6	4.2	6.8	7.8
793------------- Bertrand	I	144	48	86	6.0	4.2	6.8	7.8
793B------------ Bertrand	IIe	141	47	85	5.9	4.0	6.6	7.6
795D2----------- Ashgrove	IVe	48	---	24	1.4	1.5	1.7	3.0
826------------- Rowley	IIw	162	54	97	6.5	4.6	7.0	8.0
834------------- Titus	IIIw	125	42	68	4.3	---	---	---
893D2----------- Gara-Rinda	IVe	82	27	47	2.5	2.4	4.1	4.6
916B------------ Downs	IIe	143	48	86	6.0	4.1	7.1	8.3
916C2----------- Downs	IIIe	134	45	80	5.6	3.8	6.6	7.8
917B------------ Fayette	IIe	134	45	80	5.6	3.0	6.3	7.7
917C2----------- Fayette	IIIe	125	42	75	5.3	2.6	6.2	7.4
925------------- Toolesboro	IIw	110	36	61	---	---	---	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Oats	Bromegrass-alfalfa hay	Kentucky bluegrass	Smooth bromegrass	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*	AUM*	AUM*
960------------- Shaffton	IIw	130	44	72	5.2	4.1	6.0	7.6
961------------- Ambraw	IIw	110	36	61	4.1	3.2	5.1	6.0
1058E----------- Douds-Lindley	VIe	---	---	---	2.1	1.9	3.8	4.7
1058F, 1058G---- Douds-Lindley	VIIe	---	---	---	---	1.0	2.3	2.6
1220------------ Nodaway	Vw	---	---	---	---	3.6	---	---
1484------------ Lawson	Vw	---	---	---	---	3.0	---	---
1539------------ Coland-Perks-Lawson	Vw	---	---	---	---	2.3	---	---
1730B----------- Nodaway-Klum	Vw	---	---	---	---	3.2	---	---
3133------------ Colo	IIw	136	46	82	4.0	4.2	5.3	6.6
3133+----------- Colo	IIw	133	44	80	3.9	4.0	5.1	6.3
3539------------ Perks	IIIs	60	20	33	2.5	1.9	2.4	3.9
3834------------ Titus	IIIw	125	42	68	4.3	2.8	4.1	---
3960------------ Shaffton	IIw	130	44	72	5.2	4.1	6.0	7.6
3961------------ Ambraw	IIw	110	36	61	4.1	3.2	5.1	6.0
5010**, 5030**. Pits								

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
41, 41B, 41C---- Sparta	4S	Slight	Slight	Severe	Slight	Northern red oak---- Eastern white pine-- Red pine----------- Jack pine-----------	70 --- --- ---	4 --- --- ---	Red pine, eastern white pine, jack pine.
63B, 63C-------- Chelsea	3S	Slight	Slight	Moderate	Slight	White oak-----------	55	3	Eastern white pine, Scotch pine, European larch, eastern redcedar, red pine, jack pine.
63E------------ Chelsea	3R	Moderate	Severe	Moderate	Slight	White oak-----------	55	3	Eastern white pine, Scotch pine, European larch, eastern redcedar, red pine, jack pine.
65D2----------- Lindley	2A	Slight	Slight	Slight	Slight	Blackjack oak------- Black oak-----------	50 ---	2 ---	White oak, green ash, yellow-poplar, black oak.
65E------------ Lindley	3R	Moderate	Moderate	Slight	Slight	White oak----------- Post oak------------ Blackjack oak------- Black oak----------- White oak----------- Post oak------------	60 --- --- --- --- ---	3 --- --- --- --- ---	White oak, green ash, yellow-poplar, northern red oak, black oak.
65E2----------- Lindley	2R	Moderate	Moderate	Moderate	Slight	Blackjack oak------- Black oak-----------	50 ---	2 ---	White oak, green ash, yellow-poplar, black oak.
65F, 65G-------- Lindley	3R	Moderate	Moderate	Slight	Slight	White oak----------- Post oak------------ Blackjack oak------- Black oak----------- White oak----------- Post oak------------	60 --- --- --- --- ---	3 --- --- --- --- ---	White oak, green ash, yellow-poplar, northern red oak, black oak.
74------------- Rubio	2W	Slight	Severe	Moderate	Moderate	White oak-----------	45	2	Eastern cottonwood, silver maple, laurel willow, American sycamore, green ash, northern white-cedar.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
75, 75B. Givin	3A	Slight	Slight	Slight	Slight	White oak	65	3	Eastern white pine, red pine, black walnut, sugar maple, white oak, northern red oak.
						Northern red oak	---	---	
76B, 76C, 76C2, 76D2. Ladoga	4A	Slight	Slight	Slight	Slight	White oak	75	4	Eastern white pine, red pine, white oak, sugar maple, northern red oak, European larch, black walnut.
						Northern red oak	75	4	
80B, 80C, 80C2, 80D, 80D2, 80D3. Clinton	3A	Slight	Slight	Slight	Slight	White oak	65	3	Eastern white pine, red pine, black walnut, white oak, European larch, northern red oak.
						Northern red oak	65	3	
110B. Lamont	3A	Slight	Slight	Slight	Slight	Northern red oak	55	3	Eastern white pine.
						White oak	55	3	
139. Perks	3S	Slight	Slight	Moderate	Slight	White oak	55	3	Eastern white pine.
140. Sparta	4S	Slight	Slight	Severe	Slight	Northern red oak	70	4	Red pine, eastern white pine, jack pine.
						Eastern white pine	---	---	
						Red pine	---	---	
						Jack pine	---	---	
160. Walford	2W	Slight	Severe	Moderate	Moderate	Silver maple	80	2	Eastern cottonwood, silver maple, golden willow, American sycamore, green ash, northern white-cedar.
						Eastern cottonwood	90	---	
162B, 162C, 162C2, 162D2. Downs	4A	Slight	Slight	Slight	Slight	White oak	80	4	Eastern white pine, northern red oak, green ash, yellow-poplar.
						Northern red oak	80	4	
						Yellow-poplar	90	6	
						Black walnut	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
163B, 163C, 163C2, 163D, 163D2 Fayette	4A	Slight	Slight	Slight	Slight	White oak Northern red oak Yellow-poplar Black walnut	80 80 90 ---	4 4 6 ---	Eastern white pine, northern red oak, green ash, yellow-poplar.
163E, 163E2, 163F Fayette	4R	Moderate	Moderate	Slight	Slight	White oak Northern red oak Yellow-poplar Black walnut	80 80 90 ---	4 4 6 ---	Eastern white pine, northern red oak, green ash, yellow-poplar.
164 Traer	2W	Slight	Severe	Severe	Severe	Silver maple Eastern cottonwood	80 90	2 ---	Eastern cottonwood.
165 Stronghurst	4A	Slight	Slight	Slight	Slight	White oak Northern red oak Green ash Bur oak	70 70 --- ---	4 4 --- ---	Eastern white pine, red pine, Scotch pine, eastern redcedar.
179D2 Gara	3A	Slight	Slight	Slight	Slight	White oak Northern red oak	55 55	3 3	Eastern white pine, red pine, white oak, northern red oak.
180 Keomah	3A	Slight	Slight	Slight	Slight	White oak Northern red oak	65 70	3 4	Eastern white pine, white oak, red pine, northern red oak, black walnut, sugar maple.
220 Nodaway	3A	Slight	Slight	Slight	Slight	White oak	65	3	Eastern white pine, red pine, black walnut, sugar maple, European larch.
223C2, 223D2 Rinda	2W	Slight	Severe	Moderate	Moderate	White oak Northern red oak	45 45	2 2	Silver maple, American sycamore, green ash, hackberry, white spruce.
291 Atterberry	4A	Slight	Slight	Slight	Slight	White oak Northern red oak Green ash Bur oak	70 70 --- ---	4 4 --- ---	Eastern white pine, red pine, Scotch pine, eastern redcedar.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
293C**, 293E**:									
Chelsea	4S	Slight	Slight	Moderate	Slight	White oak	70	4	Eastern white pine, red pine, jack pine.
						Red pine	72	8	
						Eastern white pine	83	12	
						Jack pine	70	7	
						Quaking aspen	72	6	
						Northern red oak	70	4	
Lamont	3A	Slight	Slight	Slight	Slight	Northern red oak	55	3	Eastern white pine.
						White oak	55	3	
Fayette	4A	Slight	Slight	Slight	Slight	White oak	80	4	Eastern white pine, northern red oak, green ash, yellow-poplar.
						Northern red oak	80	4	
						Yellow-poplar	90	6	
						Black walnut	---	---	
352B, 352C2, 352D2 Whittier	4A	Slight	Slight	Slight	Slight	White oak	75	4	Eastern white pine, red pine, black walnut, sugar maple.
						Northern red oak	80	4	
353C2, 353D2 Tell	4A	Slight	Slight	Slight	Slight	Northern red oak	75	4	Red pine, eastern white pine.
						White oak	75	4	
424E**:									
Lindley	3R	Moderate	Moderate	Slight	Slight	White oak	60	3	White oak, green ash, yellow-poplar, northern red oak, black oak.
						Post oak	---	---	
						Blackjack oak	---	---	
						Black oak	---	---	
						White oak	---	---	
						Post oak	---	---	
Keswick	3R	Moderate	Moderate	Slight	Moderate	White oak	55	3	Eastern white pine, red pine, sugar maple.
						Northern red oak	55	3	
424E2**:									
Lindley	2R	Moderate	Moderate	Moderate	Slight	Blackjack oak	50	2	White oak, green ash, yellow-poplar, black oak.
						Black oak	---	---	
Keswick	3R	Moderate	Moderate	Slight	Moderate	White oak	55	3	Eastern white pine, red pine, sugar maple.
						Northern red oak	55	3	
425D2 Keswick	3C	Slight	Slight	Slight	Moderate	White oak	55	3	Eastern white pine, red pine, sugar maple.
						Northern red oak	55	3	
430 Ackmore	3A	Slight	Slight	Slight	Slight	White oak	65	3	Eastern white pine, red pine, cottonwood, sugar maple, black walnut.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
453-------------- Tuskeego	2W	Slight	Severe	Moderate	Moderate	Silver maple-------- Eastern cottonwood--	80 90	2 ---	Eastern cottonwood, silver maple, laurel willow, American sycamore, green ash, northern white-cedar.
499G------------ Nordness	2R	Moderate	Moderate	Severe	Severe	Northern red oak---- White oak-----------	45 45	2 2	
520, 520B------- Coppock	3A	Slight	Slight	Slight	Slight	White oak----------- Northern red oak----	65 65	3 3	Eastern white pine, red pine, sugar maple.
539------------- Perks	3S	Slight	Slight	Moderate	Slight	White oak-----------	55	3	Eastern white pine.
571B, 571C2, 571D2---------- Hedrick	4A	Slight	Slight	Slight	Slight	White oak-----------	75	4	Eastern white pine, red pine, Norway spruce, Scotch pine, eastern redcedar, sugar maple, white spruce.
572B, 572C2, 572C3, 572D2, 572D3---------- Inton	3A	Slight	Slight	Slight	Slight	White oak----------- Northern red oak----	65 65	3 3	Eastern white pine, red pine, black walnut, sugar maple, black walnut.
653------------- Tuskeego	2W	Slight	Severe	Moderate	Moderate	Silver maple-------- Eastern cottonwood--	80 90	2 ---	Eastern cottonwood, silver maple, laurel willow, green ash, northern white-cedar.
688------------- Koszta	3A	Slight	Slight	Slight	Slight	White oak----------- Northern red oak----	65 70	3 4	Eastern white pine, red pine, white oak, northern red oak, sugar maple.
793, 793B------- Bertrand	4A	Slight	Slight	Slight	Slight	Northern red oak---- White ash----------- White oak----------- Bur oak------------- Black walnut--------	70 --- --- --- ---	4 --- --- --- ---	Red pine, eastern white pine, white spruce, black walnut.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
795D2----------- Ashgrove	2W	Slight	Severe	Moderate	Moderate	White oak-----------	45	2	Silver maple, American sycamore, green ash, hackberry.
						Northern red oak----	45	2	
893D2**:									
Gara-----------	3A	Slight	Slight	Slight	Slight	White oak-----------	55	3	Eastern white pine, red pine, white oak, northern red oak.
						Northern red oak----	55	3	
Rinda----------	2W	Slight	Severe	Moderate	Moderate	White oak-----------	45	2	Silver maple, American sycamore, green ash, hackberry, eastern redcedar, white spruce, Norway spruce.
						Northern red oak----	45	2	
916B, 916C2----- Downs	4A	Slight	Slight	Slight	Slight	White oak-----------	80	4	Eastern white pine, northern red oak, green ash, Scotch pine, yellow-poplar.
						Northern red oak----	80	4	
						Yellow-poplar-------	90	6	
						Black walnut--------	---	---	
917B, 917C2----- Fayette	4A	Slight	Slight	Slight	Slight	White oak-----------	80	4	Eastern white pine, northern red oak, green ash, yellow-poplar.
						Northern red oak----	80	4	
						Yellow-poplar-------	90	6	
						Black walnut--------	---	---	
1058E**, 1058F**, 1058G**:									
Douds---------	3R	Moderate	Moderate	Slight	Slight	White oak-----------	55	3	Eastern white pine, red pine, Norway spruce, European larch, white spruce, sugar maple.
						Northern red oak----	55	3	
Lindley-------	3R	Moderate	Moderate	Slight	Slight	White oak-----------	60	3	White oak, green ash, yellow-poplar, northern red oak, black oak.
						Post oak------------	---	---	
						Blackjack oak-------	---	---	
						Black oak-----------	---	---	
						White oak-----------	---	---	
						Post oak------------	---	---	
1220------------ Nodaway	3A	Slight	Slight	Slight	Slight	White oak-----------	65	3	Eastern white pine, red pine, black walnut, sugar maple, European larch.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
1539**:									
Coland.									
Perks----------	3S	Slight	Slight	Moderate	Slight	White oak-----------	55	3	Eastern white pine.
Lawson---------	2A	Slight	Slight	Slight	Slight	Silver maple-------- White ash----------- Red maple-----------	70 --- ---	2 --- ---	White spruce, white ash, silver maple.
1730B**:									
Nodaway--------	3A	Slight	Slight	Slight	Slight	White oak-----------	65	3	Eastern white pine, red pine, black walnut, sugar maple, European larch.
Klum.									
3539------------ Perks	3S	Slight	Slight	Moderate	Slight	White oak-----------	55	3	Eastern white pine.

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
11B*:					
Colo	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, blue spruce, white fir, northern white-cedar, Washington hawthorn.	Eastern white pine	Pin oak.
Ely	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
41, 41B, 41C Sparta	Siberian peashrub	Amur honeysuckle, lilac, eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Tatarian honeysuckle.	Red pine, jack pine, Austrian pine.	Eastern white pine	---
63B, 63C, 63E Chelsea	Siberian peashrub	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Amur honeysuckle, lilac, Tatarian honeysuckle.	Austrian pine, jack pine, red pine.	Eastern white pine	---
65D2, 65E, 65E2, 65F, 65G Lindley	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Northern white-cedar, Washington hawthorn, blue spruce, white fir.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
74 Rubio	---	Amur privet, silky dogwood, Amur honeysuckle, American cranberrybush.	Austrian pine, northern white-cedar, Washington hawthorn, Norway spruce, blue spruce, white fir.	Eastern white pine	Pin oak.
75, 75B Givin	---	American cranberrybush, Amur honeysuckle, Amur privet, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Pin oak, eastern white pine.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
76B, 76C, 76C2: Ladoga	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.
76D2. Ladoga					
80B, 80C, 80C2, 80D, 80D2, 80D3: Clinton	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
110B: Lamont	---	Amur privet, Washington hawthorn, Amur honeysuckle, American cranberrybush, Tatarian honeysuckle.	Austrian pine, eastern redcedar, northern white-cedar, osageorange.	Eastern white pine, Norway spruce, red pine.	---
118: Garwin	---	Amur privet, silky dogwood, Amur honeysuckle, American cranberrybush.	White fir, blue spruce, Norway spruce, northern white-cedar, Washington hawthorn, Austrian pine.	Eastern white pine	Pin oak.
119: Muscatine	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
120B, 120C2: Tama	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
122: Sperry	---	Amur privet, silky dogwood, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
127, 127B: Wiota	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
133----- Colo	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, blue spruce, white fir, northern white-cedar, Washington hawthorn.	Eastern white pine	Pin oak.
134----- Zook	---	Silky dogwood, Amur honeysuckle, American cranberrybush, Amur privet.	Norway spruce, northern white-cedar, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
135----- Coland	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
139----- Perks	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir, Austrian pine.	Norway spruce-----	Pin oak, eastern white pine.
140----- Sparta	Siberian peashrub	Amur honeysuckle, lilac, eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Tatarian honeysuckle.	Red pine, jack pine, Austrian pine.	Eastern white pine	---
141----- Watseka	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
152----- Marshan	---	Silky dogwood, northern white-cedar, American cranberrybush.	Green ash, Amur maple, white spruce.	Eastern white pine	Pin oak.
160----- Walford	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
162B, 162C, 162C2, 162D2 Downs	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
163B, 163C, 163C2, 163D, 163D2, 163E, 163E2, 163F Fayette	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
164 Traer	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, white fir, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
165 Stronghurst	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
173 Hoopeston	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
174, 174B Bolan	Siberian peashrub	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Amur honeysuckle, lilac, Tatarian honeysuckle.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---
175, 175B Dickinson	Siberian peashrub	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Amur honeysuckle, lilac, Tatarian honeysuckle.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
179D2------------- Gara	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Northern white-cedar, white fir, Washington hawthorn, blue spruce.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.
180--------------- Keomah	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
208--------------- Klum	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Norway spruce-----	Pin oak, eastern white pine.
220--------------- Nodaway	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
223C2, 223D2------ Rinda	---	Tatarian honeysuckle, eastern redcedar, Washington hawthorn, arrowwood, Amur honeysuckle, Amur privet, American cranberrybush.	Green ash, Austrian pine, osageorange.	Eastern white pine, pin oak.	---
273B, 273C-------- Olmitz	---	Amur honeysuckle, Amur privet, silky dogwood, American cranberrybush.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
279--------------- Taintor	---	Amur privet, silky dogwood, Amur honeysuckle, American cranberrybush.	Austrian pine, Washington hawthorn, northern white-cedar, Norway spruce, blue spruce, white fir.	Eastern white pine	Pin oak.
280, 280B--------- Mahaska	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, white fir, blue spruce, eastern white pine, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
281B, 281C2: Otley	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.
291: Atterberry	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
293C*, 293E*: Chelsea	Siberian peashrub, lilac.	Eastern redcedar, Tatarian honeysuckle.	Red pine, jack pine, Austrian pine.	Eastern white pine	---
Lamont	---	Amur privet, Washington hawthorn, Amur honeysuckle, American cranberrybush, Tatarian honeysuckle.	Austrian pine, eastern redcedar, northern white-cedar, osage-orange.	Eastern white pine, Norway spruce, red pine.	---
Fayette	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
352B, 352C2, 352D2: Whittier	Siberian peashrub	Tatarian honeysuckle, lilac, Amur honeysuckle, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, red pine, Austrian pine, eastern white pine.	---	---
353C2, 353D2: Tell	Siberian peashrub	Tatarian honeysuckle, lilac, Amur honeysuckle, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, red pine, Austrian pine, eastern white pine.	---	---
354. Aquolls					
424E*, 424E2*: Lindley.					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
424E*, 424E2*: Keswick	---	Eastern redcedar, Tatarian honeysuckle, Washington hawthorn, arrowwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
425D2 Keswick	---	Eastern redcedar, Tatarian honeysuckle, Washington hawthorn, arrowwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
428B Ely	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
430 Ackmore	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
453 Tuskeego	---	Amur privet, silky dogwood, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
473 Gilford	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, northern white-cedar, Washington hawthorn, blue spruce, white fir, Austrian pine.	Eastern white pine	Pin oak.
484 Lawson	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
499G. Nordness					
520, 520B. Coppock					
539. Perks	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
570B, 570C2. Nira	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	White fir, blue spruce, Washington hawthorn, northern white-cedar.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.
571B, 571C2, 571D2. Hedrick	---	American cranberrybush, Amur honeysuckle, silky dogwood, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
572B, 572C2, 572C3, 572D2, 572D3. Inton	---	American cranberrybush, Amur honeysuckle, Amur privet, silky dogwood.	Washington hawthorn, northern white-cedar, blue spruce.	Austrian pine, Norway spruce.	Eastern white pine, pin oak, silver maple.
573. Hoopeston	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
653. Tuskeego	---	Amur privet, silky dogwood, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
684. Elrick	---	Silky dogwood, Amur honeysuckle, American cranberrybush.	Northern white-cedar, white fir, blue spruce, Washington hawthorn, Austrian pine, Amur privet.	Norway spruce	Pin oak, eastern white pine.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
688. Koszta	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
759. Fruitfield	Siberian peashrub, gray dogwood.	Siberian crabapple, Russian-olive, eastern redcedar.	Eastern white pine, hackberry, red pine.	---	---
779. Kalona	---	Amur privet, Tatarian honeysuckle, silky dogwood, American cranberrybush.	Norway spruce, northern white-cedar, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
793, 793B. Bertrand	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Red pine, Norway spruce, Austrian pine.	Eastern white pine, pin oak.
795D2. Ashgrove	---	Eastern redcedar, Tatarian honeysuckle, Washington hawthorn, arrowwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
826. Rowley	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
834. Titus	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
893D2*:					
Gara	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Northern white-cedar, white fir, Washington hawthorn, blue spruce.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
893D2*:					
Rinda	---	Tatarian honeysuckle, eastern redcedar, Washington hawthorn, arrowwood, Amur honeysuckle, Amur privet, American cranberrybush.	Green ash, Austrian pine, osageorange.	Eastern white pine, pin oak.	---
916B, 916C2 Downs	---	Amur privet, silky dogwood, Amur honeysuckle, American cranberrybush.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.
917B, 917C2 Fayette	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
925 Toolesboro	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
960 Shaffton	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	White fir, blue spruce, Austrian pine, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
961 Ambraw	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
1058E*, 1058F*. 1058G*:					
Douds	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
Lindley	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Northern white-cedar, Washington hawthorn, blue spruce, white fir.	Norway spruce, Austrian pine.	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1220 Nodaway	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
1484 Lawson	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
1539*:					
Coland	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Perks	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
Lawson	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
1730B*:					
Nodaway	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Klum	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Norway spruce	Pin oak, eastern white pine.
3133, 3133+ Colo	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, blue spruce, white fir, northern white-cedar, Washington hawthorn.	Eastern white pine	Pin oak.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
3539 Perks	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
3834 Titus	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
3960 Shaffton	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	White fir, blue spruce, Austrian pine, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
3961 Ambraw	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
5010*, 5030*. Pits					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
11B*:					
Colo	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
Ely	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight	Slight.
41, 41B Sparta	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
41C Sparta	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
63B Chelsea	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
63C Chelsea	Slight	Slight	Severe: slope.	Slight	Moderate: droughty.
63E Chelsea	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
65D2 Lindley	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
65E, 65E2, 65F Lindley	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
65G Lindley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
74 Rubio	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
75 Givin	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.
75B Givin	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight.
76B Ladoga	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
76C, 76C2 Ladoga	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight	Slight.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
76D2: Ladoga	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
80B: Clinton	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
80C, 80C2: Clinton	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight	Slight.
80D, 80D2, 80D3: Clinton	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
110B: Lamont	Slight	Slight	Moderate: slope.	Slight	Slight.
118: Garwin	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
119: Muscatine	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
120B: Tama	Slight	Slight	Moderate: slope.	Slight	Slight.
120C2: Tama	Slight	Slight	Severe: slope.	Slight	Slight.
122: Sperry	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
127: Wiota	Severe: flooding.	Slight	Slight	Slight	Slight.
127B: Wiota	Severe: flooding.	Slight	Moderate: slope.	Slight	Slight.
133: Colo	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
134: Zook	Severe: wetness, flooding, too clayey.	Severe: too clayey.	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey.
135: Coland	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
139: Perks	Severe: flooding.	Slight	Slight	Slight	Severe: droughty.
140: Sparta	Slight	Slight	Slight	Slight	Moderate: droughty.
141: Watseka	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
152 Marshan	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
160 Walford	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
162B Downs	Slight	Slight	Moderate: slope.	Slight	Slight.
162C, 162C2 Downs	Slight	Slight	Severe: slope.	Slight	Slight.
162D2 Downs	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
163B Fayette	Slight	Slight	Moderate: slope.	Slight	Slight.
163C, 163C2 Fayette	Slight	Slight	Severe: slope.	Slight	Slight.
163D, 163D2 Fayette	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
163E, 163E2, 163F Fayette	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
164 Traer	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
165 Stronghurst	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
173 Hoopeston	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
174 Bolan	Slight	Slight	Slight	Slight	Slight.
174B Bolan	Slight	Slight	Moderate: slope.	Slight	Slight.
175 Dickinson	Slight	Slight	Slight	Slight	Slight.
175B Dickinson	Slight	Slight	Moderate: slope.	Slight	Slight.
179D2 Gara	Moderate: percs slowly, slope.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
180 Keomah	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.
208 Klum	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
220: Nodaway	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
223C2: Rinda	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
223D2: Rinda	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.
273B: Olmitz	Slight	Slight	Moderate: slope.	Slight	Slight.
273C: Olmitz	Slight	Slight	Severe: slope.	Slight	Slight.
279: Taintor	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
280: Mahaska	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
280B: Mahaska	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight	Slight.
281B: Otley	Slight	Slight	Moderate: slope.	Slight	Slight.
281C2: Otley	Slight	Slight	Severe: slope.	Slight	Slight.
291: Atterberry	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
293C*:					
Chelsea	Slight	Slight	Severe: slope.	Slight	Moderate: droughty.
Lamont	Slight	Slight	Severe: slope.	Slight	Slight.
Fayette	Slight	Slight	Severe: slope.	Slight	Slight.
293E*:					
Chelsea	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, droughty.
Lamont	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Fayette	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
352B------------------ Whittier	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
352C2----------------- Whittier	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
352D2----------------- Whittier	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
353C2----------------- Tell	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
353D2----------------- Tell	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
354. Aquolls					
424E*, 424E2*:					
Lindley--------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Keswick--------------	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: erodes easily.	Severe: slope.
425D2----------------- Keswick	Severe: wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, wetness.	Severe: erodes easily.	Moderate: wetness, slope.
428B------------------ Ely	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight----------	Slight.
430------------------- Ackmore	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
453------------------- Tuskeego	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
473------------------- Gilford	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
484------------------- Lawson	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
499G------------------ Nordness	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, depth to rock.
520, 520B------------- Coppock	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
539------------------- Perks	Severe: flooding.	Slight----------	Slight----------	Slight----------	Severe: droughty.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
570B------------------ Nira	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
570C2----------------- Nira	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
571B------------------ Hedrick	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
571C2----------------- Hedrick	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
571D2----------------- Hedrick	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
572B------------------ Inton	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
572C2, 572C3---------- Inton	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
572D2, 572D3---------- Inton	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
573------------------- Hoopeston	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
653------------------- Tuskeego	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
684------------------- Elrick	Severe: flooding.	Slight----------	Slight----------	Slight----------	Slight.
688------------------- Koszta	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Slight----------	Slight.
759------------------- Fruitfield	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
779------------------- Kalona	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
793------------------- Bertrand	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
793B------------------ Bertrand	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
795D2----------------- Ashgrove	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.
826------------------- Rowley	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
834 Titus	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
893D2*:					
Gara	Moderate: percs slowly, slope.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
Rinda	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.
916B Downs	Slight	Slight	Moderate: slope.	Slight	Slight.
916C2 Downs	Slight	Slight	Severe: slope.	Slight	Slight.
917B Fayette	Slight	Slight	Moderate: slope.	Slight	Slight.
917C2 Fayette	Slight	Slight	Severe: slope.	Slight	Slight.
925 Toolesboro	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
960 Shaffton	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Slight	Moderate: flooding.
961 Ambraw	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
1058E*, 1058F*:					
Douds	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Lindley	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
1058G*:					
Douds	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lindley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
1220 Nodaway	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
1484 Lawson	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1539*:					
Coland	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
Perks	Severe: flooding.	Moderate: flooding.	Slight	Moderate: flooding.	Severe: droughty, flooding.
Lawson	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
1730B*:					
Nodaway	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Klum	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
3133, 3133+ Colo	Severe: flooding, wetness.	Moderate: wetness, too sandy.	Severe: wetness.	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.
3539 Perks	Severe: flooding.	Slight	Slight	Slight	Severe: droughty.
3834 Titus	Severe: flooding, ponding.	Severe: flooding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
3960 Shaffton	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
3961 Ambraw	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
5010*, 5030*. Pits					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
11B*:										
Colo	Good	Fair	Good	Fair	Poor	Good	Good	Fair	Fair	Good.
Ely	Good	Good	Good	Good	Good	Fair	Very poor.	Good	Good	Poor.
41, 41B Sparta	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
41C Sparta	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
63B, 63C Chelsea	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
63E Chelsea	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
65D2 Lindley	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
65E, 65E2, 65F Lindley	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
65G Lindley	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
74 Rubio	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
75, 75B Givin	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
76B Ladoga	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor.
76C, 76C2, 76D2 Ladoga	Fair	Good	Fair	Good	Good	Very poor.	Poor	Fair	Good	Very poor.
80B Clinton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
80C, 80C2, 80D, 80D2, 80D3 Clinton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
110B Lamont	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
118 Garwin	Good	Good	Good	Fair	Poor	Good	Good	Good	Fair	Good.
119 Muscatine	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
120B. Tama	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
120C2. Tama	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
122. Sperry	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
127, 127B. Wiota	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
133. Colo	Good	Fair	Good	Fair	Poor	Good	Good	Fair	Fair	Good.
134. Zook	Good	Fair	Good	Fair	Poor	Good	Good	Fair	Fair	Good.
135. Coland	Good	Good	Good	Fair	Fair	Good	Good	Good	Fair	Good.
139. Perks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
140. Sparta	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
141. Watseka	Fair	Fair	Good	Good	Good	Fair	Poor	Fair	Good	Poor.
152. Marshan	Good	Good	Good	Fair	Poor	Good	Good	Good	Fair	Good.
160. Walford	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
162B. Downs	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
162C, 162C2, 162D2. Downs	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
163B. Fayette	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
163C, 163C2, 163D, 163D2. Fayette	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
163E, 163E2, 163F. Fayette	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
164. Traer	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
165. Stronghurst	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
173. Hoopeston	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
174, 174B----------Bolan	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
175, 175B----------Dickinson	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
179D2--------------Gara	Fair	Good	Fair	Good	Good	Very poor.	Poor	Fair	Good	Poor.
180----------------Keomah	Good	Good	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair.
208----------------Klum	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
220----------------Nodaway	Good	Good	Good	Good	Fair	Fair	Poor	Fair	Good	Fair.
223C2, 223D2-------Rinda	Poor	Fair	Poor	Fair	Poor	Very poor.	Very poor.	Fair	Fair	Very poor.
273B---------------Olmitz	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor.
273C---------------Olmitz	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
279----------------Taintor	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
280, 280B----------Mahaska	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
281B---------------Otley	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor.
281C2--------------Otley	Fair	Good	Fair	Good	Good	Very poor.	Poor	Fair	Good	Very poor.
291----------------Atterberry	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
293C*:										
Chelsea-----------	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Lamont------------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Fayette-----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
293E*:										
Chelsea-----------	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Lamont------------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
293E*:										
Fayette	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
352B Whittier	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
352C2, 352D2 Whittier	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
353C2, 353D2 Tell	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
354. Aquolls										
424E*, 424E2*:										
Lindley	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Keswick	Poor	Fair	Fair	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.
425D2 Keswick	Fair	Good	Fair	Good	Fair	Very poor.	Poor	Fair	Good	Very poor.
428B Ely	Good	Good	Good	Good	Good	Fair	Very poor.	Good	Good	Poor.
430 Ackmore	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
453 Tuskeego	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
473 Gilford	Fair	Poor	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
484 Lawson	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
499G Nordness	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
520, 520B Coppock	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
539 Perks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
570B Nira	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor.
570C2 Nira	Fair	Good	Fair	Good	Good	Very poor.	Poor	Fair	Good	Very poor.
571B Hedrick	Good	Good	Fair	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
571C2, 571D2 Hedrick	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
572B Inton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
572C2, 572C3, 572D2, 572D3 Inton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
573 Hoopeston	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
653 Tuskeego	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
684 Elrick	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
688 Koszta	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
759 Fruitfield	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
779 Kalona	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
793, 793B Bertrand	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
795D2 Ashgrove	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor.
826 Rowley	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
834 Titus	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
893D2*:										
Gara	Fair	Good	Fair	Good	Good	Very poor.	Poor	Fair	Good	Poor.
Rinda	Poor	Fair	Poor	Fair	Poor	Very poor.	Very poor.	Fair	Fair	Very poor.
916B Downs	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
916C2 Downs	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
917B Fayette	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
917C2 Fayette	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
925 Toolesboro	Good	Fair	Good	Good	Fair	Good	Good	Good	Good	Good.
960 Shaffton	Good	Good	Good	Good	Fair	Good	Good	Good	Good	Good.
961 Ambraw	Good	Fair	Good	Good	Fair	Good	Good	Good	Good	Good.
1058E*, 1058F*:										
Douds	Very poor.	Good	Fair	Good	Fair	Very poor.	Very poor.	Poor	Good	Very poor.
Lindley	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
1058G*:										
Douds	Very poor.	Good	Fair	Good	Fair	Very poor.	Very poor.	Poor	Good	Very poor.
Lindley	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
1220 Nodaway	Poor	Fair	Fair	Poor	Poor	Good	Fair	Poor	Poor	Fair.
1484 Lawson	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
1539*:										
Coland	Poor	Fair	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
Perks	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Poor	Very poor.
Lawson	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
1730B*:										
Nodaway	Poor	Fair	Fair	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Klum	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
3133, 3133+ Colo	Good	Fair	Good	Fair	Poor	Fair	Very poor.	Fair	Fair	Good.
3539 Perks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
3834 Titus	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
3960 Shaffton	Good	Good	Good	Good	Fair	Good	Good	Good	Good	Good.
3961 Ambraw	Good	Fair	Good	Good	Fair	Good	Good	Good	Good	Good.
5010*, 5030*. Pits										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
11B*:						
Colo	Severe: wetness.	Severe: flooding, shrink-swell, wetness.	Severe: flooding, shrink-swell, wetness.	Severe: flooding, shrink-swell, wetness.	Severe: flooding, low strength, frost action.	Moderate: wetness, flooding.
Ely	Severe: wetness.	Severe: low strength.	Severe: low strength, wetness.	Severe: low strength.	Severe: frost action, low strength.	Slight.
41, 41B Sparta	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty, too sandy.
41C Sparta	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty, too sandy.
63B Chelsea	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
63C Chelsea	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
63E Chelsea	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
65D2 Lindley	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
65E, 65E2, 65F, 65G Lindley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
74 Rubio	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness, low strength.	Severe: wetness.
75, 75B Givin	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: frost action, low strength.	Slight.
76B Ladoga	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
76C, 76C2 Ladoga	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
76D2: Ladoga	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
80B: Clinton	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
80C, 80C2: Clinton	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
80D, 80D2, 80D3: Clinton	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
110B: Lamont	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
118: Garwin	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: frost action, low strength, shrink-swell.	Moderate: wetness.
119: Muscatine	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
120B: Tama	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
120C2: Tama	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: frost action, low strength.	Slight.
122: Sperry	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, frost action.	Severe: ponding.
127, 127B: Wiota	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: frost action, low strength.	Slight.
133: Colo	Severe: wetness.	Severe: flooding, shrink-swell, wetness.	Severe: flooding, shrink-swell, wetness.	Severe: flooding, shrink-swell, wetness.	Severe: flooding, low strength, frost action.	Moderate: wetness, flooding.
134: Zook	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, low strength, frost action.	Severe: too clayey.
135: Coland	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
139: Perks	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: droughty.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
140 Sparta	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
141 Watseka	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
152 Marshan	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
160 Walford	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, frost action, low strength.	Severe: wetness.
162B Downs	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
162C, 162C2 Downs	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: frost action, low strength.	Slight.
162D2 Downs	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
163B Fayette	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
163C, 163C2 Fayette	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: frost action, low strength.	Slight.
163D, 163D2 Fayette	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
163E, 163E2, 163F Fayette	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
164 Traer	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, frost action.	Severe: wetness.
165 Stronghurst	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
173 Hoopeston	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
174, 174B Bolan	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
175, 175B--------- Dickinson	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
179D2------------- Gara	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
180--------------- Keomah	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, frost action, low strength.	Slight.
208--------------- Klum	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
220--------------- Nodaway	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action, low strength.	Moderate: flooding.
223C2------------- Rinda	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: frost action, low strength, shrink-swell.	Moderate: wetness.
223D2------------- Rinda	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: frost action, low strength, shrink-swell.	Moderate: wetness, slope.
273B-------------- Olmitz	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
273C-------------- Olmitz	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
279--------------- Taintor	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
280, 280B--------- Mahaska	Severe: wetness.	Moderate: shrink-swell, wetness.	Severe: wetness.	Moderate: shrink-swell, wetness.	Severe: low strength, frost action.	Slight.
281B-------------- Otley	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
281C2------------- Otley	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
291--------------- Atterberry	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
293C*: Chelsea----------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: droughty.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
293C*:						
Lamont	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
Fayette	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
293E*:						
Chelsea	Severe: cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lamont	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Fayette	Severe: cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, frost action, slope.	Severe: slope.
352B Whittier	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Severe: low strength.	Slight.
352C2 Whittier	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
352D2 Whittier	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
353C2 Tell	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
353D2 Tell	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
354. Aquolls						
424E*, 424E2*:						
Lindley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Keswick	Severe: wetness, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, slope.	Severe: wetness, shrink-swell, slope.	Severe: low strength, slope, frost action.	Severe: slope.
425D2 Keswick	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness, slope.
428B Ely	Severe: wetness.	Severe: low strength.	Severe: low strength, wetness.	Severe: low strength.	Severe: frost action, low strength.	Slight.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
430 Ackmore	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
453 Tuskeego	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness.
473 Gilford	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
484 Lawson	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Moderate: wetness, flooding.
499G Nordness	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock, thin layer.
520, 520B Coppock	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, frost action.	Moderate: wetness.
539 Perks	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: droughty.
570B Nira	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
570C2 Nira	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
571B Hedrick	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
571C2 Hedrick	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
571D2 Hedrick	Moderate: wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
572B Inton	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
572C2, 572C3 Inton	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
572D2, 572D3------ Inton	Moderate: wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
573--------------- Hoopeston	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
653--------------- Tuskeego	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.
684--------------- Elrick	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
688--------------- Koszta	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, frost action.	Slight.
759--------------- Fruitfield	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Severe: droughty.
779--------------- Kalona	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
793, 793B--------- Bertrand	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
795D2------------- Ashgrove	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness, slope.
826--------------- Rowley	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, frost action.	Moderate: wetness.
834--------------- Titus	Severe: cutbanks cave, ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding.
893D2*:						
Gara-------------	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Rinda------------	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: frost action, low strength, shrink-swell.	Moderate: wetness, slope.
916B-------------- Downs	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
916C2 Downs	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
917B Fayette	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
917C2 Fayette	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
925 Toolesboro	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.
960 Shaffton	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
961 Ambraw	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
1058E*, 1058F*, 1058G*:						
Douds	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lindley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
1220 Nodaway	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action, low strength.	Severe: flooding.
1484 Lawson	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
1539*:						
Coland	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, flooding, frost action.	Severe: flooding.
Perks	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: droughty, flooding.
Lawson	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1730B*:						
Nodaway	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action, low strength.	Severe: flooding.
Klum	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
3133, 3133+ Colo	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: low strength, frost action.	Moderate: wetness.
3539 Perks	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Slight	Severe: droughty.
3834 Titus	Severe: cutbanks cave, ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding.	Severe: ponding.
3960 Shaffton	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding, frost action.	Slight.
3961 Ambraw	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.
5010*, 5030*. Pits						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
11B*:					
Colo	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Poor: wetness, hard to pack.
Ely	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
41, 41B Sparta	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
41C Sparta	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
63B Chelsea	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
63C Chelsea	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
63E Chelsea	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy, slope.	Severe: seepage, slope.	Poor: too sandy, slope, seepage.
65D2 Lindley	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
65E, 65E2, 65F, 65G Lindley	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
74 Rubio	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness, hard to pack.
75, 75B Givin	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
76B Ladoga	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
76C, 76C2 Ladoga	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
76D2 Ladoga	Severe: percs slowly.	Severe: slope.	Moderate: too clayey, slope.	Moderate: slope.	Fair: too clayey, slope.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
80B----------------- Clinton	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
80C, 80C2----------- Clinton	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
80D, 80D2, 80D3----- Clinton	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
110B---------------- Lamont	Slight-----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: thin layer.
118----------------- Garwin	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
119----------------- Muscatine	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
120B---------------- Tama	Slight-----------	Moderate: slope, seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
120C2--------------- Tama	Slight-----------	Severe: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
122----------------- Sperry	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
127, 127B----------- Wiota	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Moderate: flooding.	Fair: too clayey.
133----------------- Colo	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Poor: wetness, hard to pack.
134----------------- Zook	Severe: percs slowly, wetness, flooding.	Severe: flooding.	Severe: wetness, too clayey, flooding.	Severe: wetness, flooding.	Poor: too clayey, wetness, hard to pack.
135----------------- Coland	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
139----------------- Perks	Severe: flooding, poor filter.	Severe: flooding, seepage.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
140----------------- Sparta	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
141----------------- Watseka	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: wetness, seepage, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness, seepage.
152----------------- Marshan	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
160----------------- Walford	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
162B---------------- Downs	Slight-----------	Moderate: slope, seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
162C, 162C2--------- Downs	Slight-----------	Severe: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
162D2--------------- Downs	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: slope, too clayey.
163B---------------- Fayette	Slight-----------	Moderate: slope, seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
163C, 163C2--------- Fayette	Slight-----------	Severe: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
163D, 163D2--------- Fayette	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: slope, too clayey.
163E, 163E2, 163F--- Fayette	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
164----------------- Traer	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
165----------------- Stronghurst	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
173----------------- Hoopeston	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
174, 174B----------- Bolan	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
175, 175B----------- Dickinson	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
179D2 Gara	Severe: percs slowly.	Severe: slope.	Moderate: too clayey, slope.	Moderate: slope.	Fair: too clayey, slope.
180 Keomah	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
208 Klum	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
220 Nodaway	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
223C2, 223D2 Rinda	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey, wetness, hard to pack.
273B Olmitz	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
273C Olmitz	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
279 Taintor	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
280, 280B Mahaska	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
281B Otley	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
281C2 Otley	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
291 Atterberry	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
293C*:					
Chelsea	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
Lamont	Slight	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: thin layer.
Fayette	Moderate: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Slight	Fair: too clayey, thin layer.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
293E*:					
Chelsea	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
Lamont	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope, thin layer.
Fayette	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope.
352B Whittier	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
352C2, 352D2 Whittier	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
353C2, 353D2 Tell	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
354. Aquolls					
424E*, 424E2*:					
Lindley	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Keswick	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: wetness, slope.	Severe: wetness, slope.	Poor: slope, wetness.
425D2 Keswick	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
428B Ely	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
430 Ackmore	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness, hard to pack.
453 Tuskeego	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: hard to pack, wetness, too clayey.
473 Gilford	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
484----------------- Lawson	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
499G---------------- Nordness	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: depth to rock, slope, area reclaim.
520, 520B----------- Coppock	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
539----------------- Perks	Severe: flooding, poor filter.	Severe: flooding, seepage.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
570B---------------- Nira	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Poor: hard to pack.
570C2--------------- Nira	Moderate: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness.	Poor: hard to pack.
571B---------------- Hedrick	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Poor: hard to pack.
571C2--------------- Hedrick	Moderate: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness.	Poor: hard to pack.
571D2--------------- Hedrick	Moderate: wetness, percs slowly, slope.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Poor: hard to pack.
572B---------------- Inton	Moderate: wetness.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Poor: hard to pack.
572C2, 572C3-------- Inton	Moderate: wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness.	Poor: hard to pack.
572D2, 572D3-------- Inton	Moderate: slope, wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Poor: hard to pack.
573----------------- Hoopeston	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
653----------------- Tuskeego	Severe: wetness, percs slowly.	Severe: wetness, seepage.	Severe: seepage, wetness.	Severe: wetness.	Poor: hard to pack, wetness.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
684 Elrick	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
688 Koszta	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
759 Fruitfield	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
779 Kalona	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey, hard to pack.
793, 793B Bertrand	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey, thin layer.
795D2 Ashgrove	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
826 Rowley	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
834 Titus	Severe: flooding, ponding, percs slowly.	Slight	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
893D2*:					
Gara	Severe: percs slowly.	Severe: slope.	Moderate: too clayey, slope.	Moderate: slope.	Fair: too clayey, slope.
Rinda	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey, wetness, hard to pack.
916B Downs	Slight	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey, thin layer.
916C2 Downs	Slight	Severe: seepage, slope.	Severe: seepage.	Slight	Fair: too clayey, thin layer.
917B Fayette	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey, thin layer.
917C2 Fayette	Moderate: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Slight	Fair: too clayey, thin layer.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
925----------------- Toolesboro	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
960----------------- Shaffton	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: thin layer.
961----------------- Ambraw	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
1058E*, 1058F*, 1058G*:					
Douds-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Lindley-----------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
1220---------------- Nodaway	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
1484---------------- Lawson	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
1539*:					
Coland-------------	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
Perks--------------	Severe: flooding, poor filter.	Severe: flooding, seepage.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
Lawson-------------	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
1730B*:					
Nodaway------------	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
Klum---------------	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
3133, 3133+--------- Colo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
3539----------------- Perks	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
3834----------------- Titus	Severe: ponding, percs slowly.	Slight-----------	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
3960----------------- Shaffton	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: thin layer.
3961----------------- Ambraw	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
5010*, 5030*. Pits					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
11B*:				
Colo	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ely	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
41, 41B, 41C Sparta	Good	Probable	Improbable: too sandy.	Poor: too sandy.
63B, 63C Chelsea	Good	Probable	Improbable: too sandy.	Fair: too sandy.
63E Chelsea	Fair: slope.	Probable	Improbable: too sandy.	Poor: slope.
65D2 Lindley	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
65E, 65E2, 65F Lindley	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
65G Lindley	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
74 Rubio	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
75, 75B Givin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
76B, 76C, 76C2, 76D2 Ladoga	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
80B, 80C, 80C2, 80D, 80D2, 80D3 Clinton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
110B Lamont	Good	Probable	Improbable: too sandy.	Good.
118 Garwin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
119 Muscatine	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
120B, 120C2 Tama	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
122 Sperry	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
127, 127B Wiota	Good	Probable	Improbable: too sandy.	Good.
133 Colo	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
134 Zook	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
135 Coland	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
139 Perks	Good	Probable	Improbable: too sandy.	Fair: too sandy.
140 Sparta	Good	Probable	Improbable: too sandy.	Poor: thin layer.
141 Watseka	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too sandy.
152 Marshan	Fair: wetness.	Probable	Improbable: too sandy.	Fair: area reclaim, thin layer.
160 Walford	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
162B, 162C, 162C2 Downs	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
162D2 Downs	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
163B, 163C, 163C2 Fayette	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
163D, 163D2 Fayette	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
163E, 163E2, 163F Fayette	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
164 Traer	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
165 Stronghurst	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
173 Hoopeston	Fair: wetness.	Probable	Improbable: too sandy.	Fair: small stones, thin layer.
174, 174B Bolan	Good	Probable	Improbable: too sandy.	Good.
175, 175B Dickinson	Good	Probable	Improbable: too sandy.	Good.
179D2 Gara	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.
180 Keomah	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
208 Klum	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
220 Nodaway	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
223C2, 223D2 Rinda	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
273B, 273C Olmitz	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
279 Taintor	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
280, 280B Mahaska	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
281B, 281C2 Otley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
291 Atterberry	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
293C*:				
Chelsea	Good	Probable	Improbable: too sandy.	Fair: too sandy.
Lamont	Good	Probable	Improbable: too sandy.	Good.
Fayette	Good	Probable	Improbable: too sandy.	Good.
293E*:				
Chelsea	Good	Probable	Improbable: too sandy.	Fair: too sandy, slope.
Lamont	Good	Probable	Improbable: too sandy.	Fair: slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
293E*:				
Fayette	Good	Probable	Improbable: too sandy.	Fair: slope.
352B, 352C2 Whittier	Good	Probable	Improbable: too sandy.	Fair: thin layer.
352D2 Whittier	Good	Probable	Improbable: too sandy.	Fair: thin layer, slope.
353C2 Tell	Good	Probable	Improbable: too sandy.	Fair: thin layer.
353D2 Tell	Good	Probable	Improbable: too sandy.	Fair: thin layer, slope.
354. Aquolls				
424E*, 424E2*:				
Lindley	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Keswick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
425D2 Keswick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
428B Ely	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
430 Ackmore	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
453 Tuskeego	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
473 Gilford	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
484 Lawson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
499G Nordness	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope, area reclaim.
520, 520B Coppock	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
539 Perks	Good	Probable	Improbable: too sandy.	Good.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
570B, 570C2: Nira	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
571B, 571C2: Hedrick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
571D2: Hedrick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
572B, 572C2: Inton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
572C3: Inton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
572D2: Inton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
572D3: Inton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
573: Hoopeston	Fair: wetness.	Probable	Improbable: too sandy.	Fair: small stones, thin layer.
653: Tuskeego	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
684: Elrick	Good	Probable	Improbable: too sandy.	Fair: small stones, area reclaim, thin layer.
688: Koszta	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
759: Fruitfield	Good	Probable	Improbable: too sandy.	Poor: too sandy.
779: Kalona	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
793, 793B: Bertrand	Good	Probable	Improbable: too sandy.	Good.
795D2: Ashgrove	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
826: Rowley	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
834: Titus	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
893D2*:				
Gara	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
893D2*:				
Rinda	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
916B, 916C2 Downs	Good	Probable	Improbable: too sandy.	Good.
917B, 917C2 Fayette	Good	Probable	Improbable: too sandy.	Good.
925 Toolesboro	Poor: wetness.	Probable	Probable	Poor: wetness.
960 Shaffton	Fair: wetness.	Probable	Improbable: too sandy.	Good.
961 Ambraw	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
1058E*, 1058F*:				
Douds	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Lindley	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
1058G*:				
Douds	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Lindley	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
1220 Nodaway	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
1484 Lawson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
1539*:				
Coland	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Perks	Good	Probable	Improbable: too sandy.	Fair: small stones.
Lawson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
1730B*:				
Nodaway	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Klum	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
3133, 3133+ Colo	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
3539 Perks	Good	Probable	Improbable: too sandy.	Good.
3834 Titus	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
3960 Shaffton	Fair: wetness.	Probable	Improbable: too sandy.	Good.
3961 Ambraw	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
5010*, 5030*. Pits				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
11B*:						
Colo	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness	Wetness.
Ely	Moderate: slope, seepage.	Moderate: wetness.	Moderate: deep to water, slow refill.	Slope, frost action.	Erodes easily, wetness.	Erodes easily.
41, 41B, 41C Sparta	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
63B, 63C Chelsea	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
63E Chelsea	Severe: slope, seepage.	Severe: piping, seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
65D2, 65E, 65E2, 65F, 65G Lindley	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope.
74 Rubio	Slight	Severe: wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, erodes easily.	Wetness, erodes easily, percs slowly.
75 Givin	Slight	Moderate: wetness, hard to pack.	Severe: slow refill.	Frost action	Wetness, erodes easily.	Erodes easily.
75B Givin	Moderate: slope.	Moderate: wetness, hard to pack.	Severe: slow refill.	Frost action, slope.	Wetness, erodes easily.	Erodes easily.
76B, 76C, 76C2 Ladoga	Moderate: seepage, slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
76D2 Ladoga	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
80B, 80C, 80C2 Clinton	Moderate: seepage, slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
80D, 80D2, 80D3 Clinton	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
110B Lamont	Severe: seepage.	Moderate: thin layer.	Severe: no water.	Deep to water	Soil blowing	Favorable.
118 Garwin	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Frost action	Wetness	Wetness.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
119 Muscatine	Moderate: seepage.	Moderate: wetness.	Moderate: deep to water, slow refill.	Frost action	Wetness, erodes easily.	Erodes easily.
120B, 120C2 Tama	Moderate: slope, seepage.	Slight	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
122 Sperry	Slight	Severe: ponding.	Severe: slow refill.	Ponding, percs slowly, frost action.	Erodes easily, ponding.	Wetness, erodes easily, percs slowly.
127 Wiota	Moderate: seepage.	Slight	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
127B Wiota	Moderate: seepage, slope.	Slight	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
133 Colo	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness	Wetness.
134 Zook	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Flooding, percs slowly, frost action.	Not needed	Not needed.
135 Coland	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness	Wetness.
139 Perks	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty, rooting depth.
140 Sparta	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
141 Watseka	Severe: seepage.	Severe: piping, seepage, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Wetness, droughty.
152 Marshan	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, too sandy.	Wetness.
160 Walford	Slight	Severe: wetness.	Severe: slow refill.	Frost action	Wetness, erodes easily.	Wetness, erodes easily.
162B, 162C, 162C2 Downs	Moderate: slope, seepage.	Slight	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
162D2 Downs	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
163B, 163C, 163C2 Fayette	Moderate: slope, seepage.	Slight	Severe: no water.	Deep to water	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
163D, 163D2, 163E, 163E2, 163F------ Fayette	Severe: slope.	Slight---------	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
164--------------- Traer	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
165--------------- Stronghurst	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Frost action---	Erodes easily, wetness.	Wetness, erodes easily.
173--------------- Hoopeston	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, too sandy, soil blowing.	Wetness, rooting depth.
174, 174B--------- Bolan	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy------	Favorable.
175, 175B--------- Dickinson	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Soil blowing, too sandy.	Favorable.
179D2------------- Gara	Severe: slope.	Slight---------	Severe: no water.	Deep to water	Slope----------	Slope.
180--------------- Keomah	Slight---------	Severe: hard to pack.	Severe: slow refill.	Frost action, percs slowly.	Wetness, erodes easily, percs slowly.	Erodes easily, percs slowly.
208--------------- Klum	Severe: seepage.	Severe: seepage, piping.	Moderate: deep to water.	Deep to water	Soil blowing---	Favorable.
220--------------- Nodaway	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.
223C2------------- Rinda	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Slope, percs slowly, frost action.	Erodes easily, wetness.	Erodes easily, wetness.
223D2------------- Rinda	Severe: slope.	Severe: hard to pack.	Severe: no water.	Slope, percs slowly, frost action.	Slope, wetness, erodes easily.	Wetness, slope, erodes easily.
273B, 273C-------- Olmitz	Moderate: seepage, slope.	Slight---------	Severe: no water.	Deep to water	Favorable------	Favorable.
279--------------- Taintor	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Frost action---	Erodes easily, wetness.	Wetness, erodes easily.
280--------------- Mahaska	Moderate: seepage.	Moderate: wetness, hard to pack.	Moderate: deep to water, slow refill.	Frost action---	Wetness, erodes easily.	Erodes easily.
280B-------------- Mahaska	Moderate: seepage, slope.	Moderate: wetness, hard to pack.	Moderate: deep to water, slow refill.	Frost action, slope.	Wetness, erodes easily.	Erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
281B, 281C2------- Otley	Moderate: seepage, slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
291--------------- Atterberry	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Frost action---	Erodes easily, wetness.	Wetness, erodes easily.
293C*:						
Chelsea----------	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
Lamont-----------	Severe: seepage.	Moderate: thin layer.	Severe: no water.	Deep to water	Soil blowing---	Favorable.
Fayette----------	Moderate: seepage, slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
293E*:						
Chelsea----------	Severe: slope, seepage.	Severe: piping, seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
Lamont-----------	Severe: seepage, slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope.
Fayette----------	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
352B, 352C2------- Whittier	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Erodes easily, too sandy.	Erodes easily.
352D2------------- Whittier	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, erodes easily, too sandy.	Slope, erodes easily.
353C2------------- Tell	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Erodes easily, too sandy.	Erodes easily.
353D2------------- Tell	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, erodes easily, too sandy.	Slope, erodes easily.
354. Aquolls						
424E*, 424E2*:						
Lindley----------	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope----------	Slope.
Keswick----------	Severe: slope.	Moderate: wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
425D2------------- Keswick	Severe: slope.	Moderate: wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
428B----------- Ely	Moderate: slope, seepage.	Moderate: wetness.	Moderate: deep to water, slow refill.	Slope, frost action.	Erodes easily, wetness.	Erodes easily.
430----------- Ackmore	Moderate: seepage.	Severe: hard to pack, wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness, erodes easily.	Wetness, erodes easily.
453----------- Tuskeego	Slight---------	Severe: wetness, hard to pack.	Severe: slow refill.	Percs slowly---	Wetness, percs slowly.	Wetness, percs slowly.
473----------- Gilford	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, frost action, cutbanks cave.	Ponding, too sandy, soil blowing.	Wetness.
484----------- Lawson	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
499G----------- Nordness	Severe: slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock, droughty.
520----------- Coppock	Moderate: seepage.	Severe: hard to pack, wetness.	Moderate: slow refill.	Frost action---	Wetness, erodes easily.	Wetness, erodes easily.
520B----------- Coppock	Moderate: seepage, slope.	Severe: hard to pack, wetness.	Moderate: slow refill.	Frost action, slope.	Wetness, erodes easily.	Wetness, erodes easily.
539----------- Perks	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty, rooting depth.
570B, 570C2------- Nira	Moderate: seepage, slope.	Moderate: hard to pack.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.
571B, 571C2------- Hedrick	Moderate: seepage, slope.	Moderate: hard to pack.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.
571D2----------- Hedrick	Severe: slope.	Moderate: hard to pack.	Moderate: deep to water, slow refill.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
572B, 572C2, 572C3----------- Inton	Moderate: seepage, slope.	Moderate: hard to pack.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.
572D2, 572D3------ Inton	Severe: slope.	Moderate: hard to pack.	Moderate: deep to water, slow refill.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
573----------- Hoopeston	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, too sandy, soil blowing.	Wetness, rooting depth.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
653-------------- Tuskeego	Moderate: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, percs slowly.	Wetness, percs slowly.
684-------------- Elrick	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Favorable.
688-------------- Koszta	Moderate: seepage.	Moderate: wetness.	Moderate: deep to water, slow refill.	Frost action---	Erodes easily, wetness.	Erodes easily.
759-------------- Fruitfield	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
779-------------- Kalona	Slight---------	Severe: wetness.	Severe: slow refill.	Frost action---	Wetness, erodes easily.	Wetness, erodes easily.
793-------------- Bertrand	Moderate: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
793B------------- Bertrand	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
795D2------------ Ashgrove	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
826-------------- Rowley	Moderate: seepage.	Severe: wetness.	Severe: cutbanks cave.	Frost action---	Erodes easily, wetness.	Wetness, erodes easily.
834-------------- Titus	Slight---------	Severe: ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, flooding.	Ponding, percs slowly.	Wetness, rooting depth, percs slowly.
893D2*:						
Gara------------	Severe: slope.	Slight---------	Severe: no water.	Deep to water	Slope----------	Slope.
Rinda-----------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Slope, percs slowly, frost action.	Slope, wetness, erodes easily.	Wetness, slope, erodes easily.
916B, 916C2------- Downs	Moderate: seepage, slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
917B, 917C2------- Fayette	Moderate: seepage, slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
925-------------- Toolesboro	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy.	Wetness, rooting depth.
960-------------- Shaffton	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Flooding-------	Erodes easily, wetness.	Erodes easily.
961-------------- Ambraw	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Flooding, frost action.	Wetness--------	Wetness.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
1058E*, 1058F*, 1058G*:						
Douds	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, rooting depth.
Lindley	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope.
1220 Nodaway	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.
1484 Lawson	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
1539*:						
Coland	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness	Wetness.
Perks	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty, rooting depth.
Lawson	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
1730B*:						
Nodaway	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.
Klum	Severe: seepage.	Severe: seepage, piping.	Moderate: deep to water.	Deep to water	Soil blowing	Favorable.
3133 Colo	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Frost action	Wetness	Wetness.
3133+ Colo	Moderate: seepage.	Severe: wetness:	Moderate: slow refill.	Frost action	Wetness, soil blowing.	Wetness.
3539 Perks	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty, rooting depth.
3834 Titus	Slight	Severe: ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, rooting depth, percs slowly.
3960 Shaffton	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Favorable	Erodes easily, wetness.	Erodes easily.
3961 Ambraw	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Frost action	Wetness	Wetness.
5010*, 5030*. Pits						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
11B*:											
Colo	0-18	Silty clay loam	CL, CH	A-7	0	100	100	90-100	90-100	40-60	15-30
	18-56	Silty clay loam	CL, CH	A-7	0	100	100	90-100	90-100	40-55	20-30
	56-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	80-100	40-55	15-30
Ely	0-27	Silty clay loam	CL, OL, OH, MH	A-7, A-6	0	100	100	95-100	95-100	30-55	10-25
	27-47	Silty clay loam	CL, ML	A-7, A-6	0	100	100	95-100	95-100	35-50	10-25
	47-60	Silt loam, silty clay loam, loam.	CL	A-6	0	100	100	90-100	85-100	25-40	10-20
41, 41B, 41C Sparta	0-22	Sand	SP-SM, SM	A-3, A-2	0	85-100	85-100	50-75	5-35	---	NP
	22-42	Loamy fine sand, fine sand, sand.	SP-SM, SM	A-2, A-3, A-4	0	85-100	85-100	50-95	5-50	---	NP
	42-60	Sand, fine sand	SP-SM, SM, SP	A-2, A-3	0	85-100	85-100	50-95	2-30	---	NP
63B, 63C, 63E Chelsea	0-6	Loamy fine sand	SM, SP-SM	A-2-4, A-3	0	100	100	65-80	10-35	---	NP
	6-60	Fine sand, sand, loamy fine sand.	SP, SM, SP-SM	A-3, A-2-4	0	100	100	65-80	3-15	---	NP
65D2, 65E, 65E2, 65F, 65G Lindley	0-9	Loam	CL	A-6	0	95-100	90-100	85-95	50-65	25-35	10-15
	9-50	Clay loam, loam	CL	A-6, A-7	0	95-100	90-100	85-95	55-75	30-45	12-20
	50-60	Loam, clay loam	CL	A-6	0	95-100	90-100	85-95	50-70	25-35	10-15
74 Rubio	0-9	Silt loam	CL, CL-ML	A-6, A-4	0	100	100	100	95-100	25-40	5-15
	9-15	Silt loam	CL-ML, CL, ML	A-4	0	100	100	100	95-100	25-35	5-10
	15-39	Silty clay, silty clay loam.	CH	A-7	0	100	100	100	95-100	55-70	30-40
	39-60	Silty clay loam	CH, CL	A-7	0	100	100	100	95-100	45-55	20-30
75, 75B Givin	0-12	Silt loam	CL, ML	A-4, A-6	0	100	100	100	95-100	30-40	5-15
	12-54	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	100	95-100	45-60	25-35
	54-60	Silty clay loam	CL	A-6, A-7	0	100	100	100	95-100	35-50	20-30
76B, 76C, 76C2, 76D2 Ladoga	0-11	Silt loam	CL, CL-ML	A-6, A-4	0	100	100	100	95-100	25-40	5-15
	11-39	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	100	95-100	40-55	25-35
	39-60	Silty clay loam, silt loam.	CL	A-6	0	100	100	100	95-100	30-40	15-20
80B, 80C, 80C2, 80D, 80D2 Clinton	0-9	Silt loam	ML	A-4	0	100	100	100	95-100	30-40	5-10
	9-49	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	100	95-100	40-55	25-35
	49-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
80D3 Clinton	0-9	Silty clay loam	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
	9-49	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	100	95-100	40-55	25-35
	49-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
110B Lamont	0-9	Fine sandy loam	SM-SC, SC	A-2, A-4	0	100	100	80-95	25-50	15-25	5-10
	9-15	Fine sandy loam, loamy fine sand.	SM, SM-SC	A-2, A-4	0	100	100	80-95	15-50	<25	NP-5
	15-60	Fine sandy loam, loam, sandy clay loam.	SM-SC, SC	A-2, A-4	0	100	100	85-95	30-50	20-30	5-10
118 Garwin	0-18	Silty clay loam	CL, CH	A-7	0	100	100	100	95-100	45-55	20-30
	18-60	Silty clay loam	CH, CL	A-7	0	100	100	100	95-100	45-55	25-35
119 Muscatine	0-15	Silty clay loam	CL	A-7	0	100	100	100	95-100	40-50	15-25
	15-46	Silty clay loam	CL	A-7	0	100	100	100	95-100	40-50	20-30
	46-60	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
120B, 120C2 Tama	0-18	Silty clay loam	ML	A-6, A-7	0	100	100	100	95-100	35-50	10-20
	18-60	Silty clay loam, silt loam.	CL	A-7	0	100	100	100	95-100	40-50	15-25
122 Sperry	0-10	Silt loam	CL	A-6	0	100	100	100	95-100	30-40	10-20
	10-19	Silt loam	CL	A-6	0	100	100	100	95-100	30-40	10-20
	19-44	Silty clay loam, silty clay.	CH	A-7	0	100	100	100	95-100	50-65	25-35
	44-60	Silty clay loam, silt loam.	CL	A-7	0	100	100	100	95-100	40-50	20-30
127, 127B Wiota	0-22	Silt loam	CL	A-6	0	100	100	100	90-95	30-40	10-20
	22-50	Silty clay loam	CL	A-7	0	100	100	100	80-95	40-50	15-25
	50-60	Sandy loam, loamy sand, sand.	SM, SP-SM, SM-SC	A-2, A-3	0	100	95-100	80-90	5-20	<20	NP-5
133 Colo	0-8	Silty clay loam	CL, CH	A-7	0	100	100	90-100	90-100	40-60	15-30
	8-49	Silty clay loam	CL, CH	A-7	0	100	100	90-100	90-100	40-55	20-30
	49-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	80-100	40-55	15-30
134 Zook	0-8	Silty clay	CH	A-7	0	100	100	95-100	95-100	60-85	35-55
	8-60	Silty clay, silty clay loam.	CH	A-7	0	100	100	95-100	95-100	60-85	35-55
135 Coland	0-9	Clay loam	CL, CH	A-7	0	100	100	95-100	65-80	45-55	20-30
	9-48	Clay loam, silty clay loam.	CL, CH	A-7	0	100	100	95-100	65-80	45-55	20-30
	48-60	Loam, sandy loam, sandy clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	100	90-100	60-70	40-60	20-40	5-15
139 Perks	0-9	Loamy sand	SM, SP, SP-SM	A-1	0	90-100	90-95	30-50	3-20	---	NP
	9-60	Sand, loamy sand	SM, SP, SP-SM	A-1	0	90-100	90-95	30-50	3-20	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
140 Sparta	0-18	Loamy sand	SM	A-2, A-4	0	85-100	85-100	50-95	15-50	---	NP
	18-46	Loamy fine sand, fine sand, sand.	SP-SM, SM	A-2, A-3, A-4	0	85-100	85-100	50-95	5-50	---	NP
	46-60	Sand, fine sand	SP-SM, SM, SP	A-2, A-3	0	85-100	85-100	50-95	2-30	---	NP
141 Watseka	0-18	Loamy fine sand	SM, SM-SC	A-2	0	100	95-100	80-100	17-35	<25	NP-5
	18-60	Fine sand, sand, loamy fine sand.	SP, SM, SP-SM	A-3, A-2	0	90-100	90-100	60-80	3-25	<20	NP-4
152 Marshan	0-17	Clay loam	CL	A-7, A-6	0	95-100	95-100	95-100	80-95	35-50	15-25
	17-37	Silty clay loam, clay loam, silt loam.	CL	A-7, A-6	0	95-100	95-100	95-100	80-95	30-50	15-30
	37-44	Fine sandy loam	SM, SC, SM-SC	A-4	0	95-100	95-100	80-90	35-50	15-25	2-8
	44-60	Loamy sand, fine sand, sand.	SM	A-2, A-4	0	85-100	85-100	50-95	15-50	---	NP
160 Walford	0-9	Silt loam	CL	A-6	0	100	100	100	95-100	30-35	10-15
	9-19	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	19-60	Silty clay loam	CL, CH	A-7	0	100	100	100	95-100	45-55	20-30
162B, 162C, 162C2, 162D2 Downs	0-9	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	9-60	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	100	95-100	35-45	15-25
163B, 163C, 163C2, 163D, 163D2, 163E, 163E2, 163F Fayette	0-11	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	11-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
164 Traer	0-13	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	13-60	Silty clay loam	CL, CH	A-7	0	100	100	100	95-100	41-55	20-30
165 Stronghurst	0-14	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	95-100	95-100	25-35	5-15
	14-48	Silty clay loam	CL	A-7	0	100	100	100	98-100	41-50	19-28
	48-60	Silt loam	CL, CL-ML	A-6, A-4	0	100	100	98-100	95-100	26-37	5-15
173 Hoopeston	0-15	Fine sandy loam	SM, SC	A-2, A-4	0	90-100	90-100	70-90	25-45	20-35	NP-10
	15-38	Sandy loam, fine sandy loam.	SM, SC, SM-SC	A-2, A-4	0	90-100	90-100	60-85	25-50	<30	NP-10
	38-60	Loamy sand, sand, fine sand.	SP-SM, SM, SC, SM-SC	A-2, A-3	0	90-100	90-100	50-80	5-20	<25	NP-10
174, 174B Bolan	0-16	Loam	CL, ML	A-4, A-6	0	100	100	85-95	50-70	30-40	5-15
	16-30	Loam, fine sandy loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	100	100	80-90	40-55	25-35	5-15
	30-40	Fine sandy loam	SM, SM-SC, SC	A-4	0	100	100	80-90	35-50	15-25	2-8
	40-60	Loamy fine sand, fine sand.	SM, SP-SM	A-2	0	100	100	70-85	10-30	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
175, 175B-------- Dickinson	0-9	Fine sandy loam	SM, SC, SM-SC	A-4, A-2	0	100	100	85-95	30-50	15-30	NP-10
	9-38	Fine sandy loam, sandy loam.	SM, SC, SM-SC	A-4	0	100	100	85-95	35-50	15-30	NP-10
	38-60	Loamy sand, loamy fine sand, fine sand.	SM, SP-SM, SM-SC	A-2, A-3	0	100	100	80-95	5-20	10-20	NP-5
179D2------------ Gara	0-7	Loam-------------	CL, CL-ML	A-4, A-6	0	95-100	85-95	75-85	55-70	20-30	5-15
	7-47	Clay loam, loam	CL	A-6	0-5	90-95	85-95	70-85	55-75	30-40	15-25
	47-60	Loam, clay loam	CL	A-6, A-7	0-5	90-95	85-95	70-85	55-75	35-45	15-25
180-------------- Keomah	0-12	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	12-46	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	100	95-100	45-60	30-45
	46-60	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	100	95-100	35-50	15-30
208-------------- Klum	0-8	Fine sandy loam	SM, ML, SC, CL	A-4	0	100	95-100	70-90	40-55	20-35	3-10
	8-60	Stratified silt loam to sandy loam.	SM, ML, SC, CL	A-4, A-2	0	100	95-100	70-95	10-70	<30	NP-10
220-------------- Nodaway	0-60	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	95-100	95-100	90-100	25-35	5-15
223C2, 223D2----- Rinda	0-8	Silty clay loam	CL	A-7	0	100	95-100	90-100	85-100	40-50	20-30
	8-15	Silty clay loam	CL, CH	A-7	0	100	95-100	90-100	85-100	45-55	20-30
	15-60	Clay, silty clay	CH	A-7	0	95-100	95-100	80-95	75-90	55-70	35-45
273B, 273C------- Olmitz	0-10	Loam-------------	CL	A-6	0	100	90-100	85-95	60-80	30-40	11-20
	10-60	Clay loam--------	CL	A-6, A-7	0	100	90-100	85-95	60-80	35-45	15-25
279-------------- Taintor	0-23	Silty clay loam	CL, CH	A-7	0	100	100	100	95-100	45-60	20-30
	23-42	Silty clay, silty clay loam.	CH	A-7	0	100	100	100	95-100	50-65	25-35
	42-60	Silty clay loam, silt loam.	CL	A-7	0	100	100	100	95-100	40-50	15-25
280, 280B-------- Mahaska	0-19	Silty clay loam	CL	A-7, A-6	0	100	100	100	95-100	35-50	15-25
	19-47	Silty clay loam, silty clay.	CH, MH	A-7	0	100	100	100	95-100	50-60	20-30
	47-60	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	100	95-100	35-45	15-20
281B, 281C2------ Otley	0-18	Silty clay loam	CL	A-7	0	100	100	100	95-100	40-50	15-25
	18-48	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	100	95-100	40-55	25-35
	48-60	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	100	95-100	35-45	20-30
291-------------- Atterberry	0-13	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	25-40	5-15
	13-60	Silty clay loam, silt loam.	CL, CH	A-7, A-6	0	100	100	95-100	95-100	35-55	20-30
293C*, 293E*:											
Chelsea---------	0-6	Loamy fine sand	SM, SP-SM	A-2-4, A-3	0	100	100	65-80	10-35	---	NP
	6-60	Fine sand, sand, loamy sand.	SP, SM, SP-SM	A-3, A-2-4	0	100	100	65-80	3-15	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
293C*, 293E*:											
Lamont----------	0-7	Fine sandy loam	SM-SC, SC	A-2, A-4	0	100	100	80-95	25-50	15-25	5-10
	7-15	Fine sandy loam, loamy fine sand.	SM, SM-SC	A-2, A-4	0	100	100	80-95	15-50	<25	NP-5
	15-60	Fine sandy loam, loam, sandy clay loam.	SM-SC, SC	A-2, A-4	0	100	100	85-95	30-50	20-30	5-10
Fayette---------	0-7	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	7-40	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
	40-46	Sandy loam, loam	SM-SC, SC	A-4	0	100	95-100	80-90	35-50	20-30	5-10
	46-60	Loamy fine sand, loamy sand, fine sand.	SP-SM, SM, SM-SC	A-2, A-3	0	100	95-100	80-90	5-20	<20	NP-5
352B, 352C2, 352D2----------- Whittier	0-8	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-95	25-35	5-15
	8-34	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	90-95	35-45	15-25
	34-39	Loam, sandy loam	CL, SC	A-6, A-4	0	100	95-100	80-90	45-75	25-40	8-20
	39-60	Loamy fine sand, fine sand, loamy sand.	SM, SM-SC, SP-SM	A-2, A-3	0	100	95-100	80-90	5-20	<20	NP-5
353C2, 353D2----- Tell	0-7	Silt loam--------	CL	A-4	0	100	100	90-100	85-95	25-30	7-10
	7-23	Silty clay loam, silt loam.	CL	A-6	0	100	100	90-100	85-95	30-40	10-16
	23-32	Loam, sandy loam, sandy clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-2	0	100	90-100	55-95	25-75	20-35	4-14
	32-60	Sand, loamy sand	SM, SP-SM, SP	A-2, A-3, A-1	0	100	90-100	45-75	0-30	---	NP
354. Aquolls											
424E*, 424E2*:											
Lindley---------	0-9	Loam-------------	CL	A-6	0	95-100	90-100	85-95	50-65	25-35	10-15
	9-50	Clay loam, loam	CL	A-6, A-7	0	95-100	90-100	85-95	55-75	30-45	12-20
	50-60	Loam, clay loam	CL	A-6	0	95-100	90-100	85-95	50-70	25-35	10-15
Keswick---------	0-13	Loam-------------	CL, CL-ML	A-6, A-4	0-5	90-100	80-100	75-90	60-80	20-30	5-15
	13-29	Clay loam, clay	CH, MH	A-7	0-5	90-100	80-100	70-90	55-80	50-60	20-30
	29-60	Clay loam--------	CL	A-6	0-5	90-100	80-100	70-90	55-80	30-40	15-25
425D2------------ Keswick	0-13	Loam-------------	CL, CL-ML	A-6, A-4	0-5	90-100	80-100	75-90	60-80	20-30	5-15
	13-29	Clay loam, clay	CH, MH	A-7	0-5	90-100	80-100	70-90	55-80	50-60	20-30
	29-60	Clay loam--------	CL	A-6	0-5	90-100	80-100	70-90	55-80	30-40	15-25
428B------------- Ely	0-27	Silty clay loam	CL, OL, OH, MH	A-7, A-6	0	100	100	95-100	95-100	30-55	10-25
	27-47	Silty clay loam	CL, ML	A-7, A-6	0	100	100	95-100	95-100	35-50	10-25
	47-60	Silt loam, silty clay loam, loam.	CL	A-6	0	100	100	90-100	85-100	25-40	10-20
430-------------- Ackmore	0-29	Silt loam--------	CL, ML	A-4, A-6, A-7	0	100	100	95-100	85-100	25-50	8-20
	29-60	Silty clay loam, silt loam.	CH, CL, MH, ML	A-7, A-6	0	100	100	95-100	85-100	35-60	15-30

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
453-------------- Tuskeego	0-17	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	95-100	25-35	5-15
	17-47	Silty clay loam, silty clay.	CH	A-7	0	100	100	95-100	95-100	50-60	25-35
	47-60	Silty clay loam	CH, CL	A-7	0	100	100	95-100	95-100	45-55	25-35
473-------------- Gilford	0-23	Fine sandy loam	SM, SC, SM-SC	A-4	0	95-100	90-100	65-80	35-45	<25	2-10
	23-36	Sandy loam, fine sandy loam.	SM, SC, SM-SC	A-2-4	0	90-100	90-100	55-70	20-35	15-30	NP-8
	36-60	Loamy sand, sand	SM, SP, SP-SM	A-3, A-1-b, A-2-4	0	90-100	85-100	18-60	3-20	---	NP
484-------------- Lawson	0-8	Silt loam--------	CL, CL-ML	A-4	0	100	100	90-100	85-100	20-30	5-10
	8-35	Silt loam--------	CL, CL-ML	A-4	0	100	100	90-100	85-100	20-30	5-10
	35-60	Silty clay loam, silt loam.	CL	A-6	0	100	100	90-100	60-100	20-40	10-25
499G------------- Nordness	0-9	Silt loam--------	CL, CL-ML	A-4	0	100	100	90-100	70-90	20-30	5-10
	9-17	Silt loam, silty clay loam, loam.	CL	A-6, A-7	0	100	100	90-100	70-90	35-45	15-25
	17	Unweathered bedrock, weathered bedrock.	---	---	---	---	---	---	---	---	---
520, 520B-------- Coppock	0-9	Silt loam--------	CL	A-6	0	100	100	98-100	95-100	30-40	10-20
	9-28	Silt loam--------	CL	A-6	0	100	100	98-100	95-100	30-40	10-20
	28-48	Silty clay loam, silt loam.	CL, CH, MH	A-6, A-7	0	100	100	98-100	95-100	35-55	15-25
	48-60	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	98-100	95-100	40-60	15-30
539-------------- Perks	0-22	Sandy loam-------	SM, SM-SC, SC	A-4	0	100	100	75-80	35-50	15-30	NP-10
	22-60	Sand, loamy sand	SM, SP, SP-SM	A-1	0	90-100	90-95	30-50	3-20	---	NP
570B, 570C2------ Nira	0-12	Silty clay loam	CL, CH	A-7	0	100	100	100	95-100	40-55	15-25
	12-48	Silty clay loam	CL, CH	A-7	0	100	100	100	95-100	40-55	20-30
	48-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
571B, 571C2, 571D2----------- Hedrick	0-9	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	100	95-100	25-40	5-15
	9-52	Silty clay loam	CL, CH	A-7	0	100	100	100	95-100	40-55	25-35
	52-60	Silty clay loam, silt loam.	CL	A-6	0	100	100	100	95-100	30-40	15-20
572B, 572C2------ Inton	0-6	Silt loam--------	ML	A-4	0	100	100	100	95-100	30-40	5-10
	6-36	Silty clay loam	CL, CH	A-7	0	100	100	100	95-100	40-55	25-35
	36-60	Silty clay loam, silt loam.	CL	A-6	0	100	100	100	95-100	30-40	15-25
572C3------------ Inton	0-6	Silty clay loam	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
	6-36	Silty clay loam	CL, CH	A-7	0	100	100	100	95-100	40-55	25-35
	36-60	Silty clay loam, silt loam.	CL	A-6	0	100	100	100	95-100	30-40	15-25

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
572D2------------ Inton	0-6	Silt loam--------	ML	A-4	0	100	100	100	95-100	30-40	5-10
	6-36	Silty clay loam	CL, CH	A-7	0	100	100	100	95-100	40-55	25-35
	36-60	Silty clay loam, silt loam.	CL	A-6	0	100	100	100	95-100	30-40	15-25
572D3------------ Inton	0-6	Silty clay loam	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
	6-36	Silty clay loam	CL, CH	A-7	0	100	100	100	95-100	40-55	25-35
	36-60	Silty clay loam, silt loam.	CL	A-6	0	100	100	100	95-100	30-40	15-25
573-------------- Hoopeston	0-15	Loam-------------	SM, SC	A-2, A-4	0	90-100	90-100	70-90	25-45	20-35	NP-10
	15-29	Sandy loam, fine sandy loam.	SM, SC, SM-SC	A-2, A-4	0	90-100	90-100	60-85	25-50	<30	NP-10
	29-60	Loamy sand, sand, fine sand.	SP-SM, SM, SC, SM-SC	A-2, A-3	0	90-100	90-100	50-80	5-20	<25	NP-10
653-------------- Tuskeego	0-23	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	98-100	95-100	25-35	5-15
	23-44	Silty clay loam	CH, CL	A-7	0	100	100	98-100	95-100	45-55	25-35
	44-52	Sandy loam-------	SM-SC, SC, SM	A-4	0	100	100	85-95	35-50	15-30	NP-10
	52-60	Loamy sand, sand	SM, SP-SM, SM-SC	A-2, A-3	0	100	95-100	80-90	5-20	<20	NP-5
684-------------- Elrick	0-14	Sandy loam-------	SC, SM-SC	A-2, A-4	0	95-100	90-100	50-70	25-40	15-25	5-10
	14-34	Sandy loam-------	SC, SM-SC	A-2, A-4	0	95-100	90-100	50-70	25-50	15-25	5-10
	34-60	Loamy sand, sand, coarse sand.	SP-SM, SP, SW	A-1	0	85-100	70-85	20-40	3-12	---	NP
688-------------- Koszta	0-15	Silt loam--------	CL	A-6	0	100	100	95-100	95-100	30-40	10-20
	15-60	Silty clay loam	CL	A-7	0	100	100	95-100	95-100	40-50	20-30
759-------------- Fruitfield	0-38	Sand-------------	SP-SM, SW-SM	A-1, A-3, A-2	0	95-99	90-99	40-60	5-10	---	NP
	38-60	Sand, coarse sand	SW, SP, SW-SM, SP-SM	A-1, A-2, A-3	0	90-99	85-95	35-55	2-6	---	NP
779-------------- Kalona	0-14	Silty clay loam	MH	A-7	0	100	100	100	95-100	50-65	20-30
	14-44	Silty clay loam, silty clay.	CH	A-7	0	100	100	100	95-100	50-65	25-35
	44-60	Silty clay loam, silt loam.	CL	A-7	0	100	100	100	95-100	40-50	15-25
793, 793B-------- Bertrand	0-13	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	90-100	85-90	25-35	6-15
	13-46	Silt loam, silty clay loam.	CL	A-6, A-4	0	100	100	90-100	85-95	25-40	7-20
	46-54	Silt loam, loam	CL	A-6	0	100	100	80-95	55-75	30-40	11-20
	54-60	Sand, fine sand, loamy sand.	SP-SM	A-2, A-3	0	95-100	95-100	50-80	5-35	---	NP
795D2------------ Ashgrove	0-8	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	85-100	35-45	15-25
	8-56	Silty clay, silty clay loam.	CH	A-7	0	100	95-100	85-100	85-100	55-70	30-40
	56-60	Clay, silty clay	CH	A-7	0	95-100	95-100	75-90	75-90	50-60	25-35
826-------------- Rowley	0-23	Silt loam--------	CL	A-4, A-6	0	100	100	90-100	70-95	25-35	8-13
	23-60	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	70-95	30-50	10-25

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
834-------------- Titus	0-20	Silty clay loam	CH, CL	A-7	0	100	100	95-100	90-100	40-55	20-30
	20-60	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	95-100	90-100	40-55	20-30
893D2*:											
Gara------------	0-7	Loam-------------	CL, CL-ML	A-4, A-6	0	95-100	85-95	75-85	55-70	20-30	5-15
	7-47	Clay loam, loam	CL	A-6	0-5	90-95	85-95	70-85	55-75	30-40	15-25
	47-60	Loam, clay loam	CL	A-6, A-7	0-5	90-95	85-95	70-85	55-75	35-45	15-25
Rinda-----------	0-8	Silty clay loam	CL	A-7	0	100	95-100	90-100	85-100	40-50	20-30
	8-15	Silty clay loam	CL, CH	A-7	0	100	95-100	90-100	85-100	45-55	20-30
	15-60	Clay, silty clay	CH	A-7	0	95-100	95-100	80-95	75-90	55-70	35-45
916B, 916C2------ Downs	0-9	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	9-41	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	100	95-100	35-45	15-25
	41-48	Silt loam--------	CL	A-6	0	100	100	100	95-100	30-40	10-20
	48-60	Loamy fine sand, loamy sand, fine sand.	SP-SM, SM, SM-SC	A-2, A-3	0	100	95-100	50-80	5-20	<20	NP-5
917B, 917C2------ Fayette	0-6	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	6-44	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
	44-50	Sandy loam, loam	SM-SC, SC	A-4	0	100	95-100	80-90	35-50	20-30	5-10
	50-60	Loamy fine sand, loamy sand, fine sand.	SP-SM, SM, SM-SC	A-2, A-3	0	100	95-100	80-90	5-20	<20	NP-5
925-------------- Toolesboro	0-13	Loam-------------	CL	A-6	0	90-100	85-100	70-85	50-65	25-40	10-20
	13-30	Sandy loam, loam	SC, SM-SC	A-2, A-4	0	90-100	85-100	50-70	25-40	15-25	5-10
	30-60	Loamy sand, sand, coarse sand.	SP-SM, SP, SW	A-1	0	70-90	70-85	20-40	3-12	---	NP
960-------------- Shaffton	0-19	Loam-------------	CL	A-6	0	100	100	85-95	60-70	30-40	11-20
	19-30	Loam-------------	CL, CL-ML	A-4, A-6	0	100	100	85-95	55-65	25-35	5-15
	30-60	Loamy sand, sandy loam, sand.	SM, SM-SC, SP-SM	A-2	0	100	100	50-75	10-30	<15	NP-5
961-------------- Ambraw	0-19	Loam-------------	CL	A-6	0	100	100	85-95	60-90	30-40	10-20
	19-45	Loam, sandy clay loam, sandy loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	100	90-100	60-70	40-60	20-40	5-15
	45-60	Stratified sandy loam to sand.	SP-SM, SM	A-2, A-3	0	75-100	90-100	60-85	5-35	<20	NP
1058E*, 1058F*, 1058G*:											
Douds----------	0-9	Loam-------------	CL	A-6	0	95-100	85-100	70-90	60-80	25-35	10-20
	9-36	Clay loam, loam, sandy clay loam.	CL, SC	A-6, A-7	0	90-100	85-100	70-80	35-60	30-45	15-25
	36-60	Stratified loamy sand to clay loam.	SC, CL, SM-SC, CL-ML	A-4, A-6, A-2	0	90-100	85-100	65-85	20-60	15-35	5-15

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
1058E*, 1058F*, 1058G*:											
Lindley	0-9	Loam	CL	A-6	0	95-100	90-100	85-95	50-65	25-35	10-15
	9-50	Clay loam, loam	CL	A-6, A-7	0	95-100	90-100	85-95	55-75	30-45	12-20
	50-60	Loam, clay loam	CL	A-6	0	95-100	90-100	85-95	50-70	25-35	10-15
1220 Nodaway	0-60	Silt loam	CL, CL-ML	A-4, A-6	0	100	95-100	95-100	90-100	25-35	5-15
1484 Lawson	0-8	Silt loam	CL, CL-ML	A-4	0	100	100	90-100	85-100	20-30	5-10
	8-35	Silt loam	CL, CL-ML	A-4	0	100	100	90-100	85-100	20-30	5-10
	35-60	Silty clay loam, silt loam.	CL	A-6	0	100	100	90-100	60-100	20-40	10-25
1539*:											
Coland	0-9	Clay loam	CL, CH	A-7	0	100	100	95-100	65-80	45-55	20-30
	9-48	Clay loam, silty clay loam.	CL, CH	A-7	0	100	100	95-100	65-80	45-55	20-30
	48-60	Loam, sandy loam, sandy clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	100	90-100	60-70	40-60	20-40	5-15
Perks	0-9	Sandy loam	SM, SM-SC, SC	A-4	0	100	100	75-80	35-50	15-30	NP-10
	9-60	Sand, loamy sand	SM, SP, SP-SM	A-1	0	90-100	90-95	30-50	3-20	---	NP
Lawson	0-8	Silt loam	CL, CL-ML	A-4	0	100	100	90-100	85-100	20-30	5-10
	8-35	Silt loam	CL, CL-ML	A-4	0	100	100	90-100	85-100	20-30	5-10
	35-60	Silty clay loam, silt loam.	CL	A-6	0	100	100	90-100	60-100	20-40	10-25
1730B*:											
Nodaway	0-60	Silt loam	CL, CL-ML	A-4, A-6	0	100	95-100	95-100	90-100	25-35	5-15
Klum	0-8	Fine sandy loam	SM, ML, SC, CL	A-4	0	100	95-100	70-90	40-55	20-35	3-10
	8-60	Stratified silt loam to sandy loam.	SM, ML, SC, CL	A-4, A-2	0	100	95-100	70-95	10-70	<30	NP-10
3133 Colo	0-8	Silty clay loam	CL, CH	A-7	0	100	100	90-100	90-100	40-60	15-30
	8-49	Silty clay loam	CL, CH	A-7	0	100	100	90-100	90-100	40-55	20-30
	49-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	80-100	40-55	15-30
3133+ Colo	0-15	Loamy sand	SM, SP, SP-SM	A-1	0	90-100	90-95	30-50	3-20	---	NP
	15-56	Silty clay loam	CL, CH	A-7	0	100	100	90-100	90-100	40-55	20-30
	56-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	80-100	40-55	15-30
3539 Perks	0-9	Sandy loam	SM, SM-SC, SC	A-4	0	100	100	75-80	35-50	15-30	NP-10
	9-60	Sand, loamy sand	SM, SP, SP-SM	A-1	0	90-100	90-95	30-50	3-20	---	NP
3834 Titus	0-20	Silty clay loam	CH, CL	A-7	0	100	100	95-100	90-100	40-55	20-30
	20-60	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	95-100	90-100	40-55	20-30

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
3960----------- Shaffton	0-19	Loam------------	CL	A-6	0	100	100	85-95	60-70	30-40	11-20
	19-30	Loam------------	CL, CL-ML	A-4, A-6	0	100	100	85-95	55-65	25-35	5-15
	30-60	Loamy sand, sandy loam.	SM, SM-SC, SP-SM	A-2	0	100	100	50-75	10-30	<15	NP-5
3961----------- Ambraw	0-19	Loam------------	CL	A-6	0	100	100	85-95	60-90	30-40	10-20
	19-45	Loam, sandy clay loam, sandy loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	100	90-100	60-70	40-60	20-40	5-15
	45-60	Stratified sandy loam to sand.	SC, ML, SP-SM, SM	A-2, A-3	0	95-100	90-100	60-85	5-35	<20	NP
5010*, 5030*. Pits											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	Pct	g/cc	In/hr	In/in	pH				
11B*:										
Colo------------	0-18	27-32	1.28-1.32	0.6-2.0	0.21-0.23	5.6-7.3	High---------	0.28	5	7
	18-56	30-35	1.25-1.35	0.6-2.0	0.18-0.20	5.6-7.3	High---------	0.28		
	56-60	25-35	1.35-1.45	0.6-2.0	0.18-0.20	6.1-7.3	High---------	0.28		
Ely------------	0-27	25-30	1.30-1.35	0.6-2.0	0.21-0.23	5.6-7.3	Moderate-----	0.32	5	7
	27-47	28-35	1.30-1.40	0.6-2.0	0.18-0.20	6.1-7.3	Moderate-----	0.43		
	47-60	20-30	1.40-1.45	0.6-2.0	0.18-0.20	6.6-8.4	Moderate-----	0.43		
41, 41B, 41C----- Sparta	0-22	1-5	1.30-1.50	6.0-20	0.06-0.09	5.1-7.3	Low----------	0.17	5	1
	22-42	1-8	1.40-1.60	6.0-20	0.05-0.11	5.1-6.5	Low----------	0.17		
	42-60	0-5	1.50-1.70	6.0-20	0.04-0.07	5.1-6.0	Low----------	0.17		
63B, 63C, 63E---- Chelsea	0-6	8-15	1.50-1.55	6.0-20	0.10-0.15	5.6-7.3	Low----------	0.17	5	2
	6-60	5-10	1.55-1.70	6.0-20	0.06-0.08	5.1-5.5	Low----------	0.17		
65D2, 65E, 65E2, 65F, 65G-------- Lindley	0-9	18-27	1.20-1.40	0.6-2.0	0.16-0.18	4.5-7.3	Low----------	0.32	5	6
	9-50	25-35	1.40-1.60	0.2-0.6	0.14-0.18	4.5-6.5	Moderate-----	0.32		
	50-60	18-32	1.45-1.65	0.2-0.6	0.12-0.16	6.1-7.8	Moderate-----	0.32		
74-------------- Rubio	0-9	16-22	1.35-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	6
	9-15	16-22	1.40-1.45	0.6-2.0	0.20-0.22	5.1-6.0	Low----------	0.37		
	15-39	35-42	1.45-1.50	0.06-0.2	0.12-0.18	5.1-5.5	High---------	0.37		
	39-60	32-40	1.50-1.55	0.2-0.6	0.18-0.20	5.1-7.3	High---------	0.37		
75, 75B---------- Givin	0-12	18-26	1.30-1.40	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-----	0.32	5	6
	12-54	36-42	1.30-1.45	0.2-0.6	0.18-0.20	5.1-6.5	Moderate-----	0.43		
	54-60	27-34	1.40-1.50	0.2-0.6	0.18-0.20	5.1-6.5	Moderate-----	0.43		
76B, 76C, 76C2, 76D2----------- Ladoga	0-11	18-35	1.30-1.35	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.32	5	6
	11-39	36-42	1.30-1.40	0.2-0.6	0.18-0.20	5.1-6.0	Moderate-----	0.43		
	39-60	24-32	1.35-1.45	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.43		
80B, 80C, 80C2, 80D, 80D2------- Clinton	0-9	16-26	1.30-1.40	0.6-2.0	0.20-0.22	5.1-7.3	Low----------	0.37	5	6
	9-49	36-42	1.35-1.45	0.2-0.6	0.16-0.20	4.5-6.5	Moderate-----	0.37		
	49-60	24-35	1.40-1.55	0.6-2.0	0.18-0.20	6.1-6.5	Moderate-----	0.37		
80D3------------ Clinton	0-9	27-34	1.30-1.40	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37	4	7
	9-49	36-42	1.35-1.45	0.2-0.6	0.16-0.20	4.5-6.0	Moderate-----	0.37		
	49-60	24-35	1.40-1.55	0.6-2.0	0.18-0.20	6.1-6.5	Moderate-----	0.37		
110B------------ Lamont	0-9	10-15	1.50-1.55	2.0-6.0	0.16-0.18	5.1-7.3	Low----------	0.24	5	3
	9-15	5-15	1.50-1.55	2.0-6.0	0.14-0.16	5.1-7.3	Low----------	0.24		
	15-60	10-22	1.45-1.65	2.0-6.0	0.14-0.16	5.1-6.0	Low----------	0.24		
118------------- Garwin	0-18	30-35	1.30-1.35	0.6-2.0	0.21-0.23	5.6-7.3	High---------	0.28	5	7
	18-60	27-35	1.28-1.35	0.6-2.0	0.18-0.20	6.1-7.3	High---------	0.28		
119------------- Muscatine	0-15	28-30	1.30-1.35	0.6-2.0	0.22-0.24	5.1-7.3	Moderate-----	0.28	5	7
	15-46	30-35	1.28-1.35	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.43		
	46-60	22-30	1.35-1.40	0.6-2.0	0.18-0.20	6.6-7.8	Moderate-----	0.43		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group
	In	Pct	g/cc	In/hr	In/in	pH				
120B, 120C2------ Tama	0-18	24-29	1.25-1.30	0.6-2.0	0.22-0.24	5.1-7.3	Moderate-----	0.32	5	7
	18-60	25-35	1.30-1.35	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.43		
122-------------- Sperry	0-10	18-22	1.35-1.40	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-----	0.28	5	6
	10-19	18-22	1.35-1.40	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-----	0.28		
	19-44	38-45	1.40-1.45	0.06-0.2	0.14-0.16	5.1-6.5	High---------	0.43		
	44-60	26-34	1.45-1.50	0.2-0.6	0.19-0.21	5.6-6.5	High---------	0.43		
127, 127B-------- Wiota	0-22	24-32	1.30-1.35	0.6-2.0	0.21-0.23	5.6-7.3	Moderate-----	0.32	5	7
	22-50	30-36	1.30-1.45	0.6-2.0	0.18-0.20	5.6-6.5	Moderate-----	0.43		
	50-60	0-20	1.65-1.75	>6.0	0.05-0.13	6.1-7.3	Low----------	0.15		
133-------------- Colo	0-8	27-32	1.28-1.32	0.6-2.0	0.21-0.23	5.6-7.3	High---------	0.28	5	7
	8-49	30-35	1.25-1.35	0.6-2.0	0.18-0.20	5.6-7.3	High---------	0.28		
	49-60	25-35	1.35-1.45	0.6-2.0	0.18-0.20	6.1-7.3	High---------	0.28		
134-------------- Zook	0-8	40-44	1.35-1.40	0.06-0.2	0.11-0.13	5.6-7.3	High---------	0.28	5	4
	8-60	36-45	1.30-1.45	0.06-0.2	0.11-0.13	5.6-7.8	High---------	0.28		
135-------------- Coland	0-9	27-35	1.40-1.50	0.6-2.0	0.20-0.22	6.1-7.3	High---------	0.28	5	7
	9-48	27-35	1.40-1.50	0.6-2.0	0.20-0.22	6.1-7.3	High---------	0.28		
	48-60	12-26	1.50-1.65	0.6-6.0	0.13-0.17	6.1-7.8	Low----------	0.28		
139-------------- Perks	0-9	2-10	1.50-1.55	6.0-20	0.07-0.09	5.6-6.5	Low----------	0.15	5	1
	9-60	2-10	1.50-1.75	6.0-20	0.02-0.04	5.6-6.5	Low----------	0.15		
140-------------- Sparta	0-18	3-10	1.20-1.40	2.0-6.0	0.09-0.12	5.1-7.3	Low----------	0.17	5	2
	18-46	1-8	1.40-1.60	6.0-20	0.05-0.11	5.1-6.5	Low----------	0.17		
	46-60	0-5	1.50-1.70	6.0-20	0.04-0.07	5.1-6.0	Low----------	0.17		
141-------------- Watseka	0-18	8-13	1.35-1.55	6.0-20	0.10-0.12	5.6-7.3	Low----------	0.17	5	2
	18-60	1-10	1.70-2.00	6.0-20	0.05-0.10	5.1-7.3	Low----------	0.17		
152-------------- Marshan	0-17	27-35	1.30-1.40	0.6-2.0	0.20-0.22	5.6-7.3	Moderate-----	0.28	4	7
	17-37	25-35	1.40-1.55	0.6-2.0	0.17-0.22	5.6-7.3	Moderate-----	0.28		
	37-44	10-16	1.50-1.60	2.0-6.0	0.11-0.13	5.6-7.3	Low----------	0.28		
	44-60	3-10	1.20-1.40	2.0-6.0	0.09-0.12	6.1-7.3	Low----------	0.17		
160-------------- Walford	0-9	20-26	1.30-1.35	0.6-2.0	0.21-0.23	5.6-7.3	Moderate-----	0.32	5	6
	9-19	18-26	1.35-1.40	0.6-2.0	0.20-0.22	5.1-7.3	Low----------	0.43		
	19-60	27-35	1.35-1.40	0.2-0.6	0.18-0.20	5.1-6.0	High---------	0.43		
162B, 162C, 162C2, 162D2---- Downs	0-9	18-24	1.25-1.30	0.6-2.0	0.21-0.23	5.1-7.3	Low----------	0.32	5	6
	9-60	26-35	1.30-1.35	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-----	0.43		
163B, 163C, 163C2, 163D, 163D2, 163E, 163E2, 163F----- Fayette	0-11	15-25	1.30-1.35	0.6-2.0	0.20-0.22	5.1-7.3	Low----------	0.37	5	6
	11-60	25-35	1.30-1.45	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-----	0.37		
164-------------- Traer	0-13	18-24	1.35-1.40	0.6-2.0	0.20-0.22	4.5-7.3	Moderate-----	0.37	5	6
	13-60	35-40	1.40-1.45	0.06-0.2	0.18-0.20	4.5-7.8	High---------	0.37		
165-------------- Stronghurst	0-14	20-27	1.25-1.45	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	6
	14-48	27-35	1.30-1.55	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.37		
	48-60	20-27	1.35-1.60	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	Pct	g/cc	In/hr	In/in	pH				
173---------------- Hoopeston	0-15	8-18	1.35-1.70	2.0-6.0	0.12-0.15	5.1-7.3	Low----------	0.20	4	3
	15-38	12-18	1.45-1.75	2.0-6.0	0.12-0.17	5.1-7.8	Low----------	0.28		
	38-60	2-10	1.50-1.80	6.0-20	0.05-0.10	4.5-8.4	Low----------	0.17		
174, 174B-------- Bolan	0-16	20-26	1.40-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.28	4	6
	16-30	12-20	1.45-1.50	0.6-2.0	0.17-0.19	5.6-6.5	Low----------	0.28		
	30-40	10-16	1.50-1.60	2.0-6.0	0.11-0.13	5.1-7.3	Low----------	0.28		
	40-60	2-8	1.60-1.70	6.0-20	0.08-0.10	5.5-7.3	Low----------	0.17		
175, 175B-------- Dickinson	0-9	10-18	1.50-1.55	2.0-6.0	0.12-0.15	5.6-7.3	Low----------	0.20	4	3
	9-38	10-15	1.45-1.55	2.0-6.0	0.12-0.15	5.1-7.3	Low----------	0.20		
	38-60	4-10	1.55-1.65	6.0-20	0.08-0.10	5.1-6.5	Low----------	0.20		
179D2------------ Gara	0-7	24-27	1.50-1.55	0.6-2.0	0.20-0.22	5.6-7.3	Moderate-----	0.28	5	6
	7-47	25-38	1.55-1.75	0.2-0.6	0.16-0.18	4.5-7.4	Moderate-----	0.28		
	47-60	24-38	1.75-1.85	0.2-0.6	0.16-0.18	6.6-8.4	Moderate-----	0.37		
180---------------- Keomah	0-12	16-22	1.30-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	5	6
	12-46	27-42	1.30-1.45	0.2-0.6	0.18-0.20	4.5-6.5	High---------	0.37		
	46-60	24-38	1.40-1.55	0.2-0.6	0.18-0.20	5.1-6.5	Moderate-----	0.37		
208---------------- Klum	0-8	5-18	1.50-1.60	2.0-6.0	0.15-0.18	6.1-7.3	Low----------	0.20	5	3
	8-60	5-18	1.50-1.60	2.0-6.0	0.13-0.18	6.1-7.3	Low----------	0.20		
220---------------- Nodaway	0-60	18-28	1.25-1.35	0.6-2.0	0.20-0.23	6.1-7.3	Moderate-----	0.37	5	6
223C2, 223D2----- Rinda	0-8	27-35	1.45-1.50	0.2-0.6	0.20-0.22	5.6-7.3	Moderate-----	0.43	2	6
	8-15	30-40	1.45-1.50	0.2-0.6	0.18-0.20	5.1-6.5	High---------	0.43		
	15-60	40-60	1.45-1.75	<0.06	0.14-0.16	5.1-7.3	High---------	0.32		
273B, 273C------- Olmitz	0-10	24-30	1.40-1.45	0.6-2.0	0.19-0.21	5.6-7.3	Moderate-----	0.28	5	6
	10-60	28-34	1.45-1.55	0.6-2.0	0.15-0.17	5.1-7.3	Moderate-----	0.28		
279---------------- Taintor	0-23	30-36	1.30-1.40	0.2-0.6	0.21-0.23	5.6-7.3	Moderate-----	0.28	5	7
	23-42	35-44	1.30-1.45	0.2-0.6	0.14-0.18	5.6-6.5	High---------	0.43		
	42-60	24-34	1.40-1.50	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-----	0.43		
280, 280B-------- Mahaska	0-19	20-32	1.30-1.40	0.6-2.0	0.21-0.23	5.1-7.3	Moderate-----	0.32	5	6
	19-47	36-42	1.30-1.45	0.6-2.0	0.14-0.18	4.5-6.5	Moderate-----	0.43		
	47-60	24-32	1.40-1.45	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.43		
281B, 281C2------ Otley	0-18	28-34	1.25-1.35	0.6-2.0	0.21-0.23	5.1-7.3	Moderate-----	0.32	5	7
	18-48	36-42	1.30-1.40	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.43		
	48-60	24-35	1.35-1.45	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.43		
291---------------- Atterberry	0-13	20-26	1.20-1.35	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.32	5	6
	13-60	25-35	1.30-1.50	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.43		
293C*, 293E*:										
Chelsea----------	0-6	8-15	1.50-1.55	6.0-20	0.10-0.15	5.6-7.3	Low----------	0.17	5	2
	6-60	5-10	1.55-1.70	6.0-20	0.06-0.08	5.1-5.5	Low----------	0.17		
Lamont-----------	0-7	10-15	1.50-1.55	2.0-6.0	0.16-0.18	5.1-7.3	Low----------	0.24	5	3
	7-15	5-15	1.50-1.55	2.0-6.0	0.14-0.16	5.1-7.3	Low----------	0.24		
	15-60	10-22	1.45-1.65	2.0-6.0	0.14-0.16	5.1-6.0	Low----------	0.24		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group
	In	Pct	g/cc	In/hr	In/in	pH				
293C*, 293E*:										
Fayette----------	0-7	15-25	1.30-1.35	0.6-2.0	0.20-0.22	5.1-7.3	Low-----------	0.37	5	6
	7-40	25-35	1.30-1.45	0.6-2.0	0.18-0.20	4.5-6.5	Moderate------	0.37		
	40-46	15-20	1.30-1.35	2.0-6.0	0.11-0.17	5.1-6.5	Low-----------	0.24		
	46-60	3-10	1.30-1.35	6.0-20	0.05-0.10	5.1-7.3	Low-----------	0.24		
352B, 352C2, 352D2------------ Whittier	0-8	18-24	1.25-1.30	0.6-2.0	0.20-0.22	5.6-7.3	Low-----------	0.32	4	6
	8-34	28-32	1.30-1.40	0.6-2.0	0.17-0.19	5.1-6.5	Moderate------	0.43		
	34-39	12-18	1.50-1.60	0.6-2.0	0.16-0.18	5.1-6.0	Low-----------	0.43		
	39-60	2-10	1.60-1.70	6.0-20	0.04-0.07	5.1-6.5	Low-----------	0.17		
353C2, 353D2------ Tell	0-7	14-18	1.35-1.45	0.6-2.0	0.22-0.24	5.1-6.5	Low-----------	0.37	4	5
	7-23	20-28	1.50-1.60	0.6-2.0	0.18-0.22	5.1-6.5	Moderate------	0.37		
	23-32	10-25	1.50-1.60	0.6-2.0	0.11-0.19	5.1-6.5	Low-----------	0.37		
	32-60	2-8	1.55-1.70	6.0-20	0.04-0.07	5.1-6.5	Low-----------	0.15		
354. Aquolls										
424E*, 424E2*:										
Lindley----------	0-9	18-27	1.20-1.40	0.6-2.0	0.16-0.18	4.5-7.3	Low-----------	0.32	5	6
	9-50	25-35	1.40-1.60	0.2-0.6	0.14-0.18	4.5-6.5	Moderate------	0.32		
	50-60	18-32	1.45-1.65	0.2-0.6	0.12-0.16	6.1-7.8	Moderate------	0.32		
Keswick----------	0-13	22-27	1.45-1.50	0.6-2.0	0.17-0.22	4.5-7.3	Moderate------	0.37	3	6
	13-29	35-48	1.45-1.60	0.06-0.2	0.11-0.15	4.5-6.0	High----------	0.37		
	29-60	30-40	1.60-1.80	0.2-0.6	0.12-0.16	4.5-6.0	Moderate------	0.37		
425D2------------- Keswick	0-13	22-27	1.45-1.50	0.6-2.0	0.17-0.22	4.5-7.3	Moderate------	0.37	3	6
	13-29	35-48	1.45-1.60	0.06-0.2	0.11-0.15	4.5-6.0	High----------	0.37		
	29-60	30-40	1.60-1.80	0.2-0.6	0.12-0.16	4.5-6.0	Moderate------	0.37		
428B-------------- Ely	0-27	25-30	1.30-1.35	0.6-2.0	0.21-0.23	5.6-7.3	Moderate------	0.32	5	7
	27-47	28-35	1.30-1.40	0.6-2.0	0.18-0.20	6.1-7.3	Moderate------	0.43		
	47-60	20-30	1.40-1.45	0.6-2.0	0.18-0.20	6.6-8.4	Moderate------	0.43		
430--------------- Ackmore	0-29	25-30	1.25-1.30	0.6-2.0	0.21-0.23	5.6-7.3	Moderate------	0.37	5	6
	29-60	26-35	1.30-1.40	0.6-2.0	0.18-0.20	5.6-7.8	High----------	0.37		
453--------------- Tuskeego	0-17	16-22	1.35-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Moderate------	0.32	3	5
	17-47	32-48	1.30-1.45	<0.06	0.13-0.17	5.1-6.5	High----------	0.32		
	47-60	28-40	1.40-1.50	0.06-0.2	0.16-0.19	5.6-6.5	Moderate------	0.32		
473--------------- Gilford	0-23	10-20	1.50-1.70	2.0-6.0	0.16-0.18	5.6-7.3	Low-----------	0.20	4	3
	23-36	8-17	1.60-1.80	2.0-6.0	0.12-0.14	5.6-7.3	Low-----------	0.20		
	36-60	3-12	1.70-1.90	6.0-20	0.05-0.08	6.1-8.4	Low-----------	0.15		
484--------------- Lawson	0-8	10-20	1.20-1.55	0.6-2.0	0.22-0.24	6.1-7.8	Low-----------	0.28	5	5
	8-35	10-20	1.20-1.55	0.6-2.0	0.20-0.22	6.1-7.8	Low-----------	0.28		
	35-60	18-30	1.55-1.65	0.6-2.0	0.18-0.20	6.1-7.8	Moderate------	0.43		
499G-------------- Nordness	0-9	18-24	1.30-1.35	0.6-2.0	0.20-0.22	5.6-7.3	Low-----------	0.43	2	6
	9-17	22-29	1.35-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Moderate------	0.43		
	17	---	---	---	---	---	-------------	----		
520, 520B--------- Coppock	0-9	16-26	1.30-1.35	0.6-2.0	0.20-0.24	6.1-7.3	Moderate------	0.32	5	6
	9-28	16-27	1.30-1.40	0.6-2.0	0.18-0.22	5.0-7.3	Moderate------	0.43		
	28-48	24-35	1.30-1.40	0.6-2.0	0.17-0.21	4.5-6.0	Moderate------	0.43		
	48-60	24-40	1.40-1.45	0.6-2.0	0.15-0.19	4.5-6.0	Moderate------	0.43		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	Pct	g/cc	In/hr	In/in	pH				
539-------------	0-22	10-15	1.50-1.55	2.0-6.0	0.12-0.15	5.6-6.5	Low----------	0.20	5	3
Perks	22-60	2-10	1.50-1.75	6.0-20	0.02-0.04	5.6-6.5	Low----------	0.15		
570B, 570C2------	0-12	28-34	1.25-1.40	0.6-2.0	0.21-0.23	5.6-7.3	Moderate-----	0.32	5	7
Nira	12-48	30-38	1.25-1.40	0.6-2.0	0.18-0.20	5.1-6.0	Moderate-----	0.43		
	48-60	24-34	1.35-1.45	0.6-2.0	0.18-0.20	5.6-6.5	Moderate-----	0.43		
571B, 571C2, 571D2-----------	0-9	16-27	1.30-1.35	0.6-2.0	0.21-0.23	5.6-7.3	Low----------	0.32	5	6
Hedrick	9-52	27-37	1.30-1.45	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.43		
	52-60	24-32	1.40-1.45	0.6-2.0	0.18-0.20	5.6-7.8	Moderate-----	0.43		
572B, 572C2------	0-6	22-27	1.30-1.40	0.6-2.0	0.20-0.22	5.1-7.3	Low----------	0.37	5	6
Inton	6-36	27-35	1.35-1.45	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.37		
	36-60	25-32	1.30-1.40	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37		
572C3------------	0-6	27-32	1.30-1.40	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37	4	7
Inton	6-36	27-35	1.35-1.45	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.37		
	36-60	25-32	1.30-1.40	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37		
572D2------------	0-6	22-27	1.30-1.40	0.6-2.0	0.20-0.22	5.1-7.3	Low----------	0.37	5	6
Inton	6-36	27-35	1.35-1.45	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.37		
	36-60	25-32	1.30-1.40	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37		
572D3------------	0-6	27-32	1.30-1.40	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37	4	7
Inton	6-36	27-35	1.35-1.45	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.37		
	36-60	25-32	1.30-1.40	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37		
573--------------	0-15	8-18	1.35-1.70	2.0-6.0	0.12-0.15	5.1-6.5	Low----------	0.20	4	3
Hoopeston	15-29	12-18	1.45-1.75	2.0-6.0	0.12-0.17	5.1-7.8	Low----------	0.28		
	29-60	2-10	1.50-1.80	6.0-20	0.05-0.10	4.5-8.4	Low----------	0.17		
653--------------	0-23	16-22	1.35-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Moderate-----	0.32	3	5
Tuskeego	23-44	35-40	1.40-1.50	0.06-0.2	0.16-0.19	5.6-6.5	Moderate-----	0.32		
	44-52	8-18	1.45-1.55	2.0-6.0	0.12-0.15	5.6-6.5	Low----------	0.24		
	52-60	3-10	1.30-1.35	6.0-20	0.5-1.0	5.6-6.5	Low----------	0.24		
684--------------	0-14	12-20	1.50-1.55	2.0-6.0	0.12-0.14	5.6-7.3	Low----------	0.20	5	3
Elrick	14-34	8-18	1.55-1.60	2.0-6.0	0.11-0.13	5.1-7.3	Low----------	0.20		
	34-60	2-8	1.60-1.75	>20	0.02-0.04	5.6-7.3	Low----------	0.20		
688--------------	0-15	18-24	1.30-1.40	0.6-2.0	0.20-0.24	5.1-7.3	Moderate-----	0.32	5	6
Koszta	15-60	28-35	1.30-1.45	0.6-2.0	0.15-0.19	5.1-7.3	Moderate-----	0.43		
759--------------	0-38	1-5	1.50-1.60	>20	0.04-0.06	5.1-7.3	Low----------	0.17	5	2
Fruitfield	38-60	0-3	1.60-1.70	>20	0.02-0.04	5.6-7.3	Low----------	0.17		
779--------------	0-14	36-39	1.35-1.40	0.2-0.6	0.18-0.20	5.6-7.3	High---------	0.28	5	7
Kalona	14-44	36-42	1.40-1.45	0.2-0.6	0.14-0.18	5.6-7.3	High---------	0.37		
	44-60	26-34	1.45-1.50	0.2-0.6	0.18-0.20	6.1-7.8	Moderate-----	0.37		
793, 793B--------	0-13	15-22	1.35-1.60	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	5
Bertrand	13-46	18-30	1.55-1.65	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-----	0.37		
	46-54	18-25	1.45-1.50	0.6-2.0	0.17-0.19	5.1-6.5	Low----------	0.37		
	54-60	1-4	1.55-1.65	6.0-20	0.05-0.09	5.1-6.5	Low----------	0.15		
795D2------------	0-8	27-40	1.45-1.50	0.2-0.6	0.18-0.20	4.5-7.3	Moderate-----	0.43	2	7
Ashgrove	8-56	35-45	1.45-1.50	<0.06	0.12-0.14	4.5-7.3	High---------	0.32		
	56-60	40-60	1.45-1.75	<0.06	0.12-0.14	4.5-7.3	High---------	0.32		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	Pct	g/cc	In/hr	In/in	pH				
826-------------- Rowley	0-23	15-22	1.35-1.45	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.28	5	5
	23-60	20-30	1.35-1.65	0.6-2.0	0.18-0.22	5.1-7.3	Low----------	0.43		
834-------------- Titus	0-20	35-45	1.30-1.50	0.06-0.2	0.11-0.22	6.1-7.8	High---------	0.32	4	4
	20-60	35-45	1.30-1.50	0.06-0.2	0.11-0.22	6.1-7.8	High---------	0.32		
893D2*:										
Gara------------	0-7	24-27	1.50-1.55	0.6-2.0	0.20-0.22	5.6-7.3	Moderate-----	0.28	5	6
	7-47	25-38	1.55-1.75	0.2-0.6	0.16-0.18	4.5-6.5	Moderate-----	0.28		
	47-60	24-38	1.75-1.85	0.2-0.6	0.16-0.18	6.6-8.4	Moderate-----	0.37		
Rinda-----------	0-8	27-35	1.45-1.50	0.2-0.6	0.20-0.22	5.6-7.3	Moderate-----	0.43	2	6
	8-15	30-40	1.45-1.50	0.2-0.6	0.18-0.20	5.1-6.5	High---------	0.43		
	15-60	40-60	1.45-1.75	<0.06	0.14-0.16	5.1-7.3	High---------	0.32		
916B, 916C2------ Downs	0-9	18-24	1.25-1.30	0.6-2.0	0.21-0.23	5.1-7.3	Low----------	0.32	5-4	6
	9-41	26-34	1.30-1.35	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-----	0.43		
	41-48	22-26	1.35-1.45	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.43		
	48-60	3-10	1.30-1.35	6.0-20	0.05-0.10	5.1-7.3	Low----------	0.24		
917B, 917C2------ Fayette	0-6	15-25	1.30-1.35	0.6-2.0	0.20-0.22	5.1-7.3	Low----------	0.37	5	6
	6-44	25-35	1.30-1.45	0.6-2.0	0.18-0.20	4.5-6.5	Moderate-----	0.37		
	44-50	15-20	1.30-1.35	2.0-6.0	0.11-0.17	5.1-6.5	Low----------	0.24		
	50-60	3-10	1.30-1.35	6.0-20	0.05-0.10	5.1-7.3	Low----------	0.24		
925-------------- Toolesboro	0-13	18-30	1.45-1.50	0.6-2.0	0.19-0.21	5.6-7.3	Low----------	0.28	5	6
	13-30	8-18	1.50-1.55	2.0-6.0	0.12-0.14	5.1-7.3	Low----------	0.20		
	30-60	2-18	1.60-1.75	>20	0.02-0.04	5.6-7.3	Low----------	0.20		
960-------------- Shaffton	0-19	20-30	1.45-1.55	0.6-2.0	0.20-0.22	5.1-7.3	Moderate-----	0.24	5	6
	19-30	18-26	1.55-1.65	0.6-2.0	0.17-0.19	4.5-6.0	Moderate-----	0.32		
	30-60	8-16	1.65-1.70	6.0-20	0.05-0.08	4.5-6.5	Low----------	0.17		
961-------------- Ambraw	0-19	18-27	1.40-1.60	0.6-2.0	0.14-0.20	5.6-7.3	Moderate-----	0.28	5	5
	19-45	18-35	1.45-1.65	0.2-2.0	0.15-0.19	5.1-7.3	Moderate-----	0.28		
	45-60	8-30	1.50-1.70	0.2-2.0	0.11-0.22	6.1-8.4	Low----------	0.28		
1058E*, 1058F*, 1058G*:										
Douds----------	0-9	20-27	1.45-1.50	0.6-2.0	0.15-0.17	5.1-7.3	Low----------	0.32	5	6
	9-36	26-35	1.45-1.60	0.6-2.0	0.15-0.17	4.5-6.0	Moderate-----	0.32		
	36-60	5-30	1.55-1.75	0.6-2.0	0.11-0.13	5.1-6.0	Low----------	0.32		
Lindley--------	0-9	18-27	1.20-1.40	0.6-2.0	0.16-0.18	4.5-7.3	Low----------	0.32	5	6
	9-50	25-35	1.40-1.60	0.2-0.6	0.14-0.18	4.5-6.5	Moderate-----	0.32		
	50-60	18-32	1.45-1.65	0.2-0.6	0.12-0.16	6.1-7.8	Moderate-----	0.32		
1220------------- Nodaway	0-60	18-28	1.25-1.35	0.6-2.0	0.20-0.23	6.1-7.3	Moderate-----	0.37	5	6
1484------------- Lawson	0-8	10-20	1.20-1.55	0.6-2.0	0.22-0.24	6.1-7.8	Low----------	0.28	5	5
	8-35	10-20	1.20-1.55	0.6-2.0	0.20-0.22	6.1-7.8	Low----------	0.28		
	35-60	18-30	1.55-1.65	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-----	0.43		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	Pct	g/cc	In/hr	In/in	pH				
1539*:										
Coland----------	0-9	27-35	1.40-1.50	0.6-2.0	0.20-0.22	6.1-7.3	High---------	0.28	5	7
	9-48	27-35	1.40-1.50	0.6-2.0	0.20-0.22	6.1-7.3	High---------	0.28		
	48-60	12-26	1.50-1.65	0.6-6.0	0.13-0.17	6.1-7.8	Low----------	0.28		
Perks-----------	0-9	10-15	1.50-1.55	2.0-6.0	0.12-0.15	5.6-6.5	Low----------	0.20	5	3
	9-60	2-10	1.50-1.75	6.0-20	0.02-0.04	5.6-6.5	Low----------	0.15		
Lawson----------	0-8	10-20	1.20-1.55	0.6-2.0	0.22-0.24	6.1-7.8	Low----------	0.28	5	5
	8-35	10-20	1.20-1.55	0.6-2.0	0.20-0.22	6.1-7.8	Low----------	0.28		
	35-60	18-30	1.55-1.65	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-----	0.43		
1730B*:										
Nodaway---------	0-60	18-28	1.25-1.35	0.6-2.0	0.20-0.23	6.1-7.3	Moderate-----	0.37	5	6
Klum------------	0-8	5-18	1.50-1.60	2.0-6.0	0.15-0.18	6.1-7.3	Low----------	0.20	5	3
	8-60	5-18	1.50-1.60	2.0-6.0	0.13-0.18	6.1-7.3	Low----------	0.20		
3133------------- Colo	0-8	27-32	1.28-1.32	0.6-2.0	0.21-0.23	5.6-7.3	High---------	0.28	5	7
	8-49	30-35	1.25-1.35	0.6-2.0	0.18-0.20	5.6-7.3	High---------	0.28		
	49-60	25-35	1.35-1.45	0.6-2.0	0.18-0.20	6.1-7.3	High---------	0.28		
3133+------------ Colo	0-15	10-20	1.50-1.55	2.0-6.0	0.12-0.15	5.6-7.3	Low----------	0.20	5	6
	15-56	30-35	1.25-1.35	0.6-2.0	0.18-0.20	5.6-7.3	High---------	0.28		
	56-60	25-35	1.35-1.45	0.6-2.0	0.18-0.20	6.1-7.3	High---------	0.28		
3539------------- Perks	0-9	10-15	1.50-1.55	2.0-6.0	0.12-0.15	5.6-6.5	Low----------	0.20	5	3
	9-60	2-10	1.50-1.75	6.0-20	0.02-0.04	5.6-6.5	Low----------	0.15		
3834------------- Titus	0-20	35-45	1.30-1.50	0.06-0.2	0.11-0.22	6.1-7.8	High---------	0.32	4	4
	20-60	35-45	1.30-1.50	0.06-0.2	0.11-0.22	6.1-7.8	High---------	0.32		
3960------------- Shaffton	0-19	20-30	1.45-1.55	0.6-2.0	0.20-0.22	5.1-7.3	Moderate-----	0.24	5	6
	19-30	18-26	1.55-1.65	0.6-2.0	0.17-0.19	4.5-6.0	Moderate-----	0.32		
	30-60	8-16	1.65-1.70	6.0-20	0.05-0.08	4.5-6.0	Low----------	0.17		
3961------------- Ambraw	0-19	18-27	1.40-1.60	0.6-2.0	0.14-0.20	5.6-7.3	Moderate-----	0.28	5	5
	19-45	18-35	1.45-1.65	0.2-2.0	0.15-0.19	5.1-7.3	Moderate-----	0.28		
	45-60	8-30	1.50-1.70	0.2-2.0	0.11-0.22	6.1-8.4	Low----------	0.28		
5010*, 5030*. Pits										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
11B*:												
Colo	B/D	Occasional	Very brief to long.	Feb-Nov	1.0-3.0	Apparent	Nov-Jul	>60	---	High	High	Moderate.
Ely	B	None	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	High	High	Moderate.
41, 41B, 41C Sparta	A	None	---	---	>6.0	---	---	>60	---	Low	Low	Moderate.
63B, 63C, 63E Chelsea	A	None	---	---	>6.0	---	---	>60	---	Low	Low	Low.
65D2, 65E, 65E2, 65F, 65G Lindley	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
74 Rubio	C/D	None	---	---	0-1.0	Perched	Nov-Jul	>60	---	High	High	Moderate.
75, 75B Givin	C	None	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	High	High	Moderate.
76B, 76C, 76C2, 76D2 Ladoga	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
80B, 80C, 80C2, 80D, 80D2, 80D3 Clinton	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
110B Lamont	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	Moderate.
118 Garwin	B/D	None	---	---	1.0-2.0	Apparent	Nov-Jul	>60	---	High	High	Moderate.
119 Muscatine	B	None	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	High	High	Moderate.
120B, 120C2 Tama	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
122----------------- Sperry	C/D	None---------	---	---	+1-1.0	Apparent	Nov-Jul	>60	---	High-----	High-----	Moderate.
127, 127B--------- Wiota	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
133----------------- Colo	B/D	Occasional	Very brief to long.	Feb-Nov	1.0-3.0	Apparent	Nov-Jul	>60	---	High-----	High-----	Moderate.
134----------------- Zook	C/D	Occasional	Brief to long.	Feb-Nov	1.0-3.0	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.
135----------------- Coland	B/D	Occasional	Brief-----	Feb-Nov	1.0-3.0	Apparent	Nov-Jul	>60	---	High-----	High-----	Low.
139----------------- Perks	A	Occasional	Very brief to brief.	Feb-Nov	>6.0	---	---	>60	---	Low------	Low------	Moderate.
140----------------- Sparta	A	None---------	---	---	>6.0	---	---	>60	---	Low------	Low------	Moderate.
141----------------- Watseka	B	None---------	---	---	1.0-3.0	Apparent	Feb-May	>60	---	Moderate	Low------	High.
152----------------- Marshan	B/D	None---------	---	---	1.0-2.5	Apparent	Oct-Jun	>60	---	High-----	High-----	Moderate.
160----------------- Walford	B/D	None---------	---	---	0-2.0	Apparent	Nov-Jul	>60	---	High-----	High-----	Moderate.
162B, 162C, 162C2, 162D2------------ Downs	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
163B, 163C, 163C2, 163D, 163D2, 163E, 163E2, 163F------------- Fayette	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
164----------------- Traer	B/D	None---------	---	---	0-2.0	Apparent	Nov-Jul	>60	---	High-----	High-----	Moderate.
165----------------- Stronghurst	B	None---------	---	---	1.0-3.0	Apparent	Apr-Jun	>60	---	High-----	High-----	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
173: Hoopeston	B	None	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High	Low	Moderate.
174, 174B: Bolan	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
175, 175B: Dickinson	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	Moderate.
179D2: Gara	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
180: Keomah	C	None	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	High	High	Moderate.
208: Klum	B	Frequent	Brief	Mar-Nov	3.0-6.0	Apparent	Nov-May	>60	---	Moderate	Low	Low.
220: Nodaway	B	Occasional	Very brief to brief.	Feb-Nov	3.0-5.0	Apparent	Apr-Jul	>60	---	High	Moderate	Low.
223C2, 223D2: Rinda	D	None	---	---	1.0-3.0	Perched	Nov-Jul	>60	---	High	High	Moderate.
273B, 273C: Olmitz	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
279: Taintor	C/D	None	---	---	1.0-2.0	Apparent	Nov-Jul	>60	---	High	High	Moderate.
280, 280B: Mahaska	B	None	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	High	High	Moderate.
281B, 281C2: Otley	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
291: Atterberry	B	None	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High	High	Moderate.
293C*, 293E*:												
Chelsea	A	None	---	---	>6.0	---	---	>60	---	Low	Low	Low.
Lamont	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	Moderate.
Fayette	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
352B, 352C2, 352D2 Whittier	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
353C2, 353D2 Tell	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	Moderate.
354. Aquolls												
424E*, 424E2*: Lindley	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Keswick	C	None	---	---	1.0-3.0	Perched	Nov-Jul	>60	---	High	High	Moderate.
425D2 Keswick	C	None	---	---	1.0-3.0	Perched	Nov-Jul	>60	---	High	High	Moderate.
428B Ely	B	None	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	High	High	Moderate.
430 Ackmore	B	Occasional	Very brief to brief.	Sep-Jun	1.0-3.0	Apparent	Nov-Jul	>60	---	High	High	Low.
453 Tuskeego	C/D	Rare	---	---	0-1.0	Apparent	Nov-Jul	>60	---	Moderate	High	Moderate.
473 Gilford	B/D	None	---	---	+.5-1.0	Apparent	Dec-May	>60	---	High	High	Moderate.
484 Lawson	C	Occasional	Brief to long.	Mar-Nov	1.0-3.0	Apparent	Nov-May	>60	---	High	Moderate	Low.
499G Nordness	B	None	---	---	>6.0	---	---	8-20	Hard	Low	Low	Low.
520, 520B Coppock	B	Rare	---	---	1.0-3.0	Apparent	Nov-Jul	>60	---	High	High	Moderate.
539 Perks	A	Occasional	Very brief to brief.	Feb-Nov	>6.0	---	---	>60	---	Low	Low	Moderate.
570B, 570C2 Nira	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	>60	---	High	Moderate	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
571B, 571C2, 571D2------------ Hedrick	B	None--------	---	---	4.0-6.0	Apparent	Nov-Jul	>60	---	High-----	Moderate	Moderate.
572B, 572C2, 572C3, 572D2, 572D3----------- Inton	B	None--------	---	---	4.0-6.0	Apparent	Nov-Jul	>60	---	High-----	Moderate	Moderate.
573--------------- Hoopeston	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	Low------	Moderate.
653--------------- Tuskeego	C/D	Rare--------	---	---	0-1.0	Apparent	Nov-Jul	>60	---	Moderate	High-----	Moderate.
684--------------- Elrick	B	Rare--------	---	---	>6.0	---	---	>60	---	Low------	Moderate	Moderate.
688--------------- Koszta	B	Rare--------	---	---	2.0-3.0	Apparent	Nov-Jul	>60	---	High-----	Moderate	Moderate.
759--------------- Fruitfield	A	Rare--------	---	---	>6.0	---	---	>60	---	Low------	Low------	Low.
779--------------- Kalona	C	None--------	---	---	1.0-2.0	Apparent	Nov-Jul	>60	---	High-----	High-----	Moderate.
793, 793B--------- Bertrand	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low------	Moderate.
795D2------------- Ashgrove	D	None--------	---	---	1.0-3.0	Perched	Nov-Jul	>60	---	High-----	High-----	Moderate.
826--------------- Rowley	C	Rare--------	---	---	1.0-3.0	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.
834--------------- Titus	B/D	Occasional	Brief-----	Mar-Jun	+.5-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
893D2*:												
Gara-------------	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Rinda------------	D	None--------	---	---	1.0-3.0	Perched	Nov-Jul	>60	---	High-----	High-----	Moderate.
916B, 916C2------- Downs	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
917B, 917C2 Fayette	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	Moderate.
925 Toolesboro	B	Rare	---	---	0-3.0	Apparent	Nov-Jul	>60	---	Low	Moderate	Moderate.
960 Shaffton	B	Occasional	Brief	Feb-Nov	2.0-4.0	Apparent	Nov-Jul	>60	---	Moderate	High	High.
961 Ambraw	B/D	Occasional	Brief	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	---	High	High	Moderate.
1058E*, 1058F*, 1058G*:												
Douds	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Lindley	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
1220 Nodaway	B	Frequent	Very brief to brief.	Feb-Nov	3.0-5.0	Apparent	Apr-Jul	>60	---	High	Moderate	Low.
1484 Lawson	C	Frequent	Brief to long.	Mar-Nov	1.0-3.0	Apparent	Nov-May	>60	---	High	Moderate	Low.
1539*:												
Coland	B/D	Frequent	Brief	Feb-Nov	1.0-3.0	Apparent	Nov-Jul	>60	---	High	High	Low.
Perks	A	Frequent	Very brief to brief.	Feb-Nov	>6.0	---	---	>60	---	Low	Low	Moderate.
Lawson	C	Frequent	Brief to long.	Mar-Nov	1.0-3.0	Apparent	Nov-May	>60	---	High	Moderate	Low.
1730B*:												
Nodaway	B	Frequent	Very brief to brief.	Feb-Nov	3.0-5.0	Apparent	Apr-Jul	>60	---	High	Moderate	Low.
Klum	B	Frequent	Brief	Mar-Nov	3.0-6.0	Apparent	Nov-May	>60	---	Moderate	Low	Low.
3133, 3133+ Colo	B	Rare	---	---	1.0-3.0	Apparent	Nov-Jul	>60	---	High	High	Moderate.
3539 Perks	A	Rare	---	---	>6.0	---	---	>60	---	Low	Low	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
3834---------------- Titus	B/D	Rare----------	---	---	+.5-2.0	Apparent	Mar-Jun	>60	---	High------	High------	Low.
3960---------------- Shaffton	B	Rare----------	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	Moderate	High------	High.
3961---------------- Ambraw	B/D	Rare----------	---	---	0-2.0	Apparent	Mar-Jun	>60	---	High------	High------	Moderate.
5010*, 5030*. Pits												

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Ackmore	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
Ambraw	Fine-loamy, mixed, mesic Fluvaquentic Haplaquolls
Aquolls	Loamy, mixed, mesic Typic Haplaquolls
*Ashgrove	Fine, montmorillonitic, mesic, sloping Aeric Ochraqualfs
Atterberry	Fine-silty, mixed, mesic Udollic Ochraqualfs
Bertrand	Fine-silty, mixed, mesic Typic Hapludalfs
Bolan	Coarse-loamy, mixed, mesic Typic Hapludolls
Chelsea	Mixed, mesic Alfic Udipsamments
Clinton	Fine, montmorillonitic, mesic Typic Hapludalfs
Coland	Fine-loamy, mixed, mesic Cumulic Haplaquolls
Colo	Fine-silty, mixed, mesic Cumulic Haplaquolls
Coppock	Fine-silty, mixed, mesic Mollic Ochraqualfs
Dickinson	Coarse-loamy, mixed, mesic Typic Hapludolls
Douds	Fine-loamy, mixed, mesic Typic Hapludalfs
Downs	Fine-silty, mixed, mesic Mollic Hapludalfs
Elrick	Coarse-loamy, mixed, mesic Typic Hapludolls
Ely	Fine-silty, mixed, mesic Cumulic Hapludolls
Fayette	Fine-silty, mixed, mesic Typic Hapludalfs
Fruitfield	Sandy, mixed, mesic Entic Hapludolls
Gara	Fine-loamy, mixed, mesic Mollic Hapludalfs
Garwin	Fine-silty, mixed, mesic Typic Haplaquolls
Gilford	Coarse-loamy, mixed, mesic Typic Haplaquolls
Givin	Fine, montmorillonitic, mesic Udollic Ochraqualfs
Hedrick	Fine-silty, mixed, mesic Mollic Hapludalfs
Hoopeston	Coarse-loamy, mixed, mesic Aquic Hapludolls
Inton	Fine-silty, mixed, mesic Typic Hapludalfs
Kalona	Fine, montmorillonitic, mesic Typic Haplaquolls
Keomah	Fine, montmorillonitic, mesic Aeric Ochraqualfs
Keswick	Fine, montmorillonitic, mesic Aquic Hapludalfs
Klum	Coarse-loamy, mixed, nonacid, mesic Mollic Udifluvents
Koszta	Fine-silty, mixed, mesic Udollic Ochraqualfs
Ladoga	Fine, montmorillonitic, mesic Mollic Hapludalfs
Lamont	Coarse-loamy, mixed, mesic Typic Hapludalfs
Lawson	Fine-silty, mixed, mesic Cumulic Hapludolls
Lindley	Fine-loamy, mixed, mesic Typic Hapludalfs
Mahaska	Fine, montmorillonitic, mesic Aquic Argiudolls
*Marshan	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Haplaquolls
Muscatine	Fine-silty, mixed, mesic Aquic Hapludolls
Nira	Fine-silty, mixed, mesic Typic Hapludolls
Nodaway	Fine-silty, mixed, nonacid, mesic Mollic Udifluvents
Nordness	Loamy, mixed, mesic Lithic Hapludalfs
Olmitz	Fine-loamy, mixed, mesic Cumulic Hapludolls
Otley	Fine, montmorillonitic, mesic Typic Argiudolls
Perks	Mixed, mesic Typic Udipsamments
Rinda	Fine, montmorillonitic, mesic, sloping Mollic Ochraqualfs
*Rowley	Fine-silty, mixed, mesic Aquic Argiudolls
Rubio	Fine, montmorillonitic, mesic Mollic Albaqualfs
Shaffton	Fine-loamy, mixed, mesic Fluvaquentic Hapludolls
Sparta	Sandy, mixed, mesic Entic Hapludolls
Sperry	Fine, montmorillonitic, mesic Typic Argialbolls
Stronghurst	Fine-silty, mixed, mesic Aeric Ochraqualfs
Taintor	Fine, montmorillonitic, mesic Typic Argiaquolls
Tama	Fine-silty, mixed, mesic Typic Argiudolls
Tell	Fine-silty over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Titus	Fine, montmorillonitic, mesic Fluvaquentic Haplaquolls
Toolesboro	Coarse-loamy, mixed, mesic Typic Haplaquolls
Traer	Fine, montmorillonitic, mesic Typic Ochraqualfs
Tuskeego	Fine, montmorillonitic, mesic Mollic Ochraqualfs
Walford	Fine-silty, mixed, mesic Mollic Ochraqualfs
Watseka	Sandy, mixed, mesic Aquic Hapludolls
Whittier	Fine-silty over sandy or sandy-skeletal, mixed, mesic Mollic Hapludalfs
Wiota	Fine-silty, mixed, mesic Typic Argiudolls
Zook	Fine, montmorillonitic, mesic Cumulic Haplaquolls

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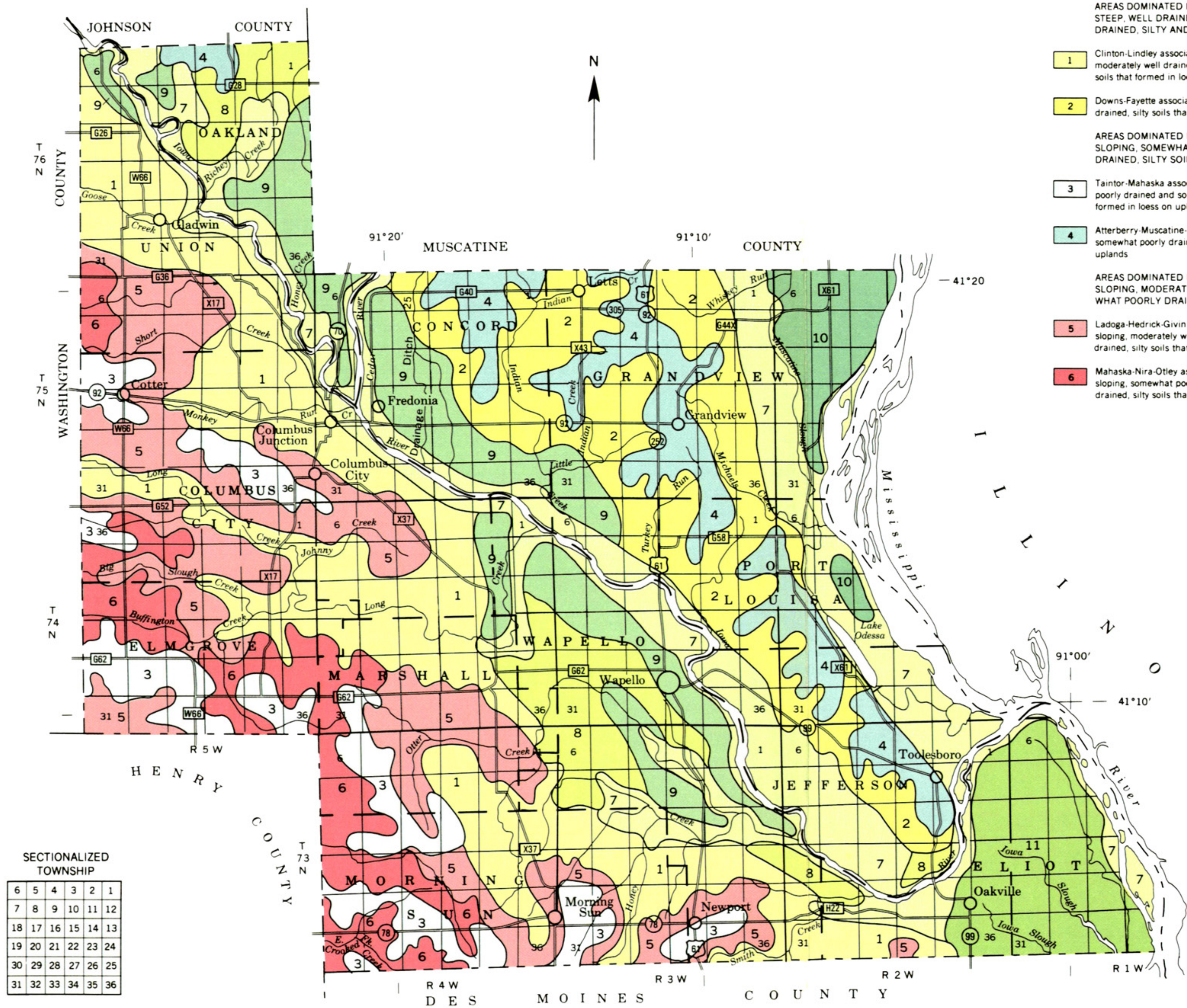


Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

LEGEND*

AREAS DOMINATED BY GENTLY SLOPING TO VERY STEEP, WELL DRAINED AND MODERATELY WELL DRAINED, SILTY AND LOAMY SOILS

1 — Clinton-Lindley association: Gently sloping to very steep, moderately well drained and well drained, silty and loamy soils that formed in loess and glacial till on uplands

2 — Downs-Fayette association: Gently sloping to steep, well drained, silty soils that formed in loess on uplands

AREAS DOMINATED BY NEARLY LEVEL TO GENTLY SLOPING, SOMEWHAT POORLY DRAINED AND POORLY DRAINED, SILTY SOILS

3 — Taintor-Mahaska association: Nearly level to gently sloping, poorly drained and somewhat poorly drained, silty soils that formed in loess on uplands

4 — Atterberry-Muscatine-Stronghurst association: Nearly level, somewhat poorly drained, silty soils that formed in loess on uplands

AREAS DOMINATED BY NEARLY LEVEL TO STRONGLY SLOPING, MODERATELY WELL DRAINED AND SOMEWHAT POORLY DRAINED, SILTY SOILS

5 — Ladoga-Hedrick-Givin association: Nearly level to strongly sloping, moderately well drained and somewhat poorly drained, silty soils that formed in loess on uplands

6 — Mahaska-Nira-Otley association: Nearly level to moderately sloping, somewhat poorly drained and moderately well drained, silty soils that formed in loess on uplands

AREAS DOMINATED BY NEARLY LEVEL, MODERATELY WELL DRAINED TO POORLY DRAINED, SILTY AND LOAMY SOILS

7 — Ambraw-Shaffton-Nodaway association: Nearly level, poorly drained to moderately well drained, silty and loamy soils that formed in alluvium on bottom land

8 — Rowley-Tuskeego-Titus association: Nearly level, somewhat poorly drained and poorly drained, silty soils that formed in alluvium on bottom land and low stream terraces

AREAS DOMINATED BY NEARLY LEVEL TO MODERATELY SLOPING, EXCESSIVELY DRAINED, WELL DRAINED, AND SOMEWHAT POORLY DRAINED, SANDY AND LOAMY SOILS

9 — Sparta-Dickinson-Hoopeston association: Nearly level to moderately sloping, excessively drained, well drained, and somewhat poorly drained, loamy and sandy soils that formed in alluvium and sandy eolian material on stream terraces and on uplands

AREAS DOMINATED BY NEARLY LEVEL AND VERY GENTLY SLOPING, EXCESSIVELY DRAINED, WELL DRAINED, AND POORLY DRAINED, SILTY, LOAMY, AND SANDY SOILS

10 — Fruitfield-Elrick-Toolesboro association: Nearly level and very gently sloping, excessively drained, well drained, and poorly drained, loamy and sandy soils that formed in alluvium on bottom land

11 — Titus-Ambraw-Colo association: Nearly level, poorly drained, silty and loamy soils that formed in alluvium on bottom land

*Unless otherwise indicated, texture terms in the descriptive headings refer to the surface layer of the major soils in the associations.

*COMPILED 1986

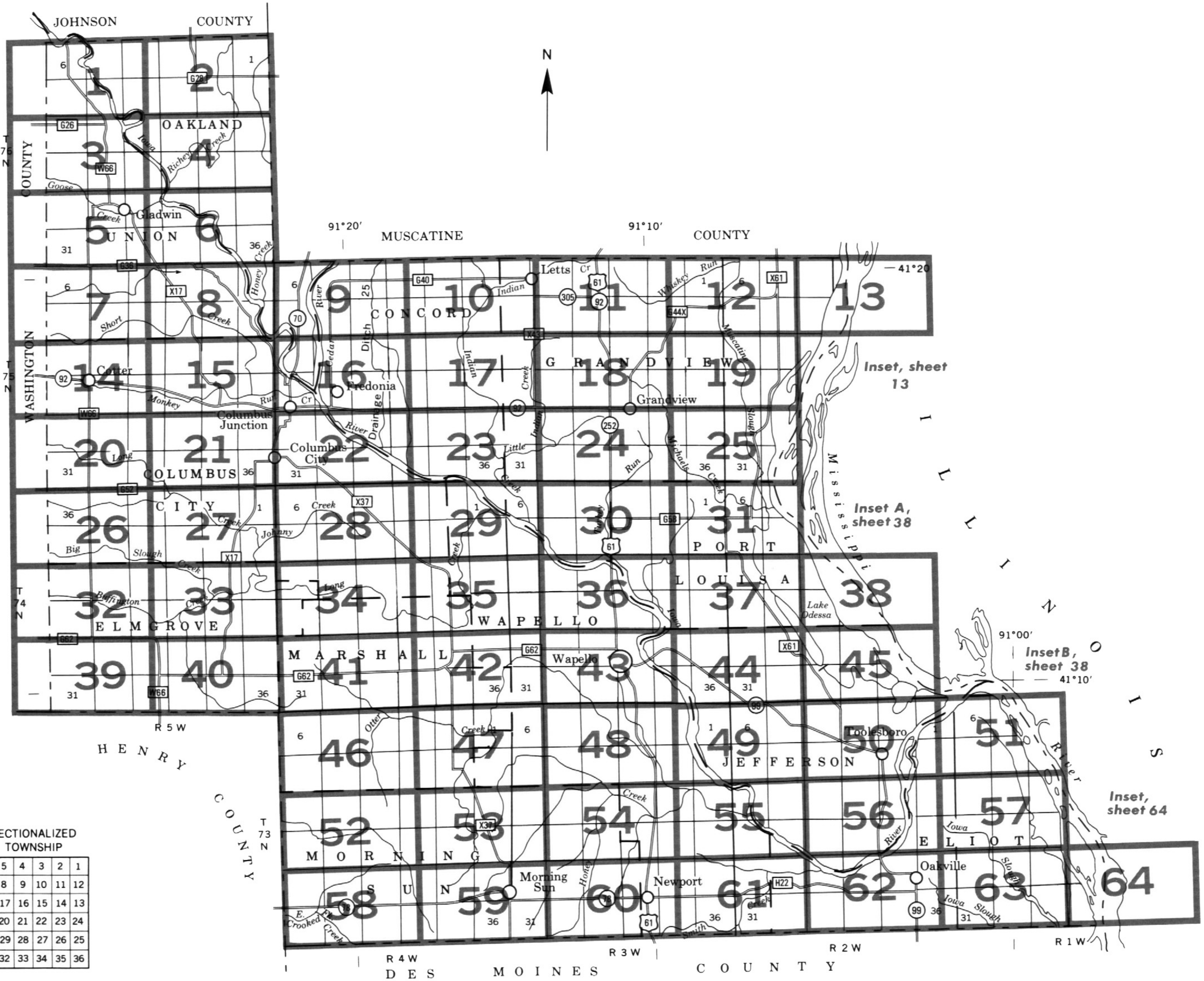
UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
IOWA AGRICULTURE AND HOME ECONOMICS EXPERIMENT STATION
COOPERATIVE EXTENSION SERVICE, IOWA STATE UNIVERSITY
DEPARTMENT OF SOIL CONSERVATION, STATE OF IOWA

GENERAL SOIL MAP
LOUISA COUNTY, IOWA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km



6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS
LOUISA COUNTY, IOWA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km

SOIL LEGEND

Map symbols consist of numbers or a combination of numbers and a letter. The initial numbers represent the kind of soil. A capital letter following these numbers indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas. A final number of 2 following the slope letter indicates that the soil is moderately eroded and 3 that it is severely eroded.

SYMBOL	NAME
11B	Colo-Ely silty clay loams, 0 to 5 percent slopes
41	Sparta sand, 0 to 2 percent slopes
41B	Sparta sand, 2 to 5 percent slopes
41C	Sparta sand, 5 to 9 percent slopes
63B	Chelsea loamy fine sand, 1 to 5 percent slopes
63C	Chelsea loamy fine sand, 5 to 9 percent slopes
63E	Chelsea loamy fine sand, 12 to 18 percent slopes
65D2	Lindley loam, 9 to 14 percent slopes, moderately eroded
65E	Lindley loam, 14 to 18 percent slopes
65E2	Lindley loam, 14 to 18 percent slopes, moderately eroded
65F	Lindley loam, 18 to 25 percent slopes
65G	Lindley loam, 25 to 40 percent slopes
74	Rubio silt loam, 0 to 2 percent slopes
75	Givin silt loam, 0 to 2 percent slopes
75B	Givin silt loam, 2 to 5 percent slopes
76B	Ladoga silt loam, 2 to 5 percent slopes
76C	Ladoga silt loam, 5 to 9 percent slopes
76C2	Ladoga silt loam, 5 to 9 percent slopes, moderately eroded
76D2	Ladoga silt loam, 9 to 14 percent slopes, moderately eroded
80B	Clinton silt loam, 2 to 5 percent slopes
80C	Clinton silt loam, 5 to 9 percent slopes
80C2	Clinton silt loam, 5 to 9 percent slopes, moderately eroded
80D	Clinton silt loam, 9 to 14 percent slopes
80D2	Clinton silt loam, 9 to 14 percent slopes, moderately eroded
80D3	Clinton silty clay loam, 9 to 14 percent slopes, severely eroded
110B	Lamont fine sandy loam, 2 to 5 percent slopes
118	Garwin silty clay loam, 0 to 2 percent slopes
119	Muscatine silty clay loam, 0 to 2 percent slopes
120B	Tama silty clay loam, 2 to 5 percent slopes
120C2	Tama silty clay loam, 5 to 9 percent slopes, moderately eroded
122	Sperry silt loam, 0 to 1 percent slopes
127	Wiota silt loam, sandy substratum, 0 to 2 percent slopes
127B	Wiota silt loam, sandy substratum, 2 to 5 percent slopes
133	Colo silty clay loam, 0 to 2 percent slopes
134	Zook silty clay, 0 to 2 percent slopes
135	Coland clay loam, 0 to 2 percent slopes
139	Perks loamy sand, 0 to 3 percent slopes
140	Sparta loamy sand, 0 to 2 percent slopes
141	Watseka loamy fine sand, 0 to 2 percent slopes
152	Marshan clay loam, 0 to 2 percent slopes
160	Walford silt loam, 0 to 1 percent slopes
162B	Downs silt loam, 2 to 5 percent slopes
162C	Downs silt loam, 5 to 9 percent slopes
162C2	Downs silt loam, 5 to 9 percent slopes, moderately eroded
162D2	Downs silt loam, 9 to 14 percent slopes, moderately eroded
163B	Fayette silt loam, 2 to 5 percent slopes
163C	Fayette silt loam, 5 to 9 percent slopes
163C2	Fayette silt loam, 5 to 9 percent slopes, moderately eroded
163D	Fayette silt loam, 9 to 14 percent slopes
163D2	Fayette silt loam, 9 to 14 percent slopes, moderately eroded
163E	Fayette silt loam, 14 to 18 percent slopes
163E2	Fayette silt loam, 14 to 18 percent slopes, moderately eroded
163F	Fayette silt loam, 18 to 25 percent slopes
164	Traer silt loam, 0 to 2 percent slopes
165	Stronghurst silt loam, 0 to 2 percent slopes
173	Hoopeston fine sandy loam, 0 to 2 percent slopes
174	Bolan loam, 0 to 2 percent slopes
174B	Bolan loam, 2 to 5 percent slopes
175	Dickinson fine sandy loam, 0 to 2 percent slopes
175B	Dickinson fine sandy loam, 2 to 5 percent slopes
179D2	Gara loam, 9 to 14 percent slopes, moderately eroded
180	Keomah silt loam, 0 to 2 percent slopes
208	Klum fine sandy loam, 0 to 2 percent slopes
220	Nodaway silt loam, 0 to 2 percent slopes
223C2	Rinda silt clay loam, 5 to 9 percent slopes, moderately eroded
223D2	Rinda silty clay loam, 9 to 14 percent slopes, moderately eroded
273B	Olmitz loam, 2 to 5 percent slopes
273C	Olmitz loam, 5 to 9 percent slopes
279	Taintor silty clay loam, 0 to 2 percent slopes
280	Mahaska silty clay loam, 0 to 2 percent slopes
280B	Mahaska silty clay loam, 2 to 5 percent slopes
281B	Otley silty clay loam, 2 to 5 percent slopes
281C2	Otley silty clay loam, 5 to 9 percent slopes, moderately eroded
291	Atterberry silt loam, 0 to 2 percent slopes
293C	Chelsea-Lamont-Fayette complex, 5 to 9 percent slopes
293E	Chelsea-Lamont-Fayette complex, 9 to 18 percent slopes
352B	Whittier silt loam, 2 to 5 percent slopes
352C2	Whittier silt loam, 5 to 9 percent slopes, moderately eroded
352D2	Whittier silt loam, 9 to 14 percent slopes, moderately eroded
353C2	Tell silt loam, 5 to 9 percent slopes, moderately eroded
353D2	Tell silt loam, 9 to 14 percent slopes, moderately eroded
354	Aquolls, ponded
424E	Lindley-Keswick loams, 14 to 18 percent slopes
424E2	Lindley-Keswick loams, 14 to 18 percent slopes, moderately eroded
425D2	Keswick loam, 9 to 14 percent slopes, moderately eroded
428B	Ely silty clay loam, 2 to 5 percent slopes
430	Ackmore silt loam, 0 to 2 percent slopes
453	Tuskeego silt loam, 0 to 2 percent slopes
473	Gilford fine sandy loam, 0 to 2 percent slopes
484	Lawson silt loam, 0 to 2 percent slopes
499G	Nordness silt loam, 18 to 40 percent slopes
520	Coppock silt loam, 0 to 2 percent slopes
520B	Coppock silt loam, 2 to 5 percent slopes
539	Perks sandy loam, 0 to 3 percent slopes
570B	Nira silty clay loam, 2 to 5 percent slopes
570C2	Nira silty clay loam, 5 to 9 percent slopes, moderately eroded
571B	Hedrick silt loam, 2 to 5 percent slopes
571C2	Hedrick silt loam, 5 to 9 percent slopes, moderately eroded
571D2	Hedrick silt loam, 9 to 14 percent slopes, moderately eroded
572B	Inton silt loam, 2 to 5 percent slopes
572C2	Inton silt loam, 5 to 9 percent slopes, moderately eroded
572C3	Inton silty clay loam, 5 to 9 percent slopes, severely eroded
572D2	Inton silt loam, 9 to 14 percent slopes, moderately eroded
572D3	Inton silty clay loam, 9 to 14 percent slopes, severely eroded
573	Hoopeston loam, 0 to 2 percent slopes
653	Tuskeego silt loam, sandy substratum, 0 to 2 percent slopes
684	Elrick sandy loam, 0 to 2 percent slopes
688	Koszta silt loam, 0 to 2 percent slopes
759	Fruitfield sand, 0 to 3 percent slopes
779	Kalona silty clay loam, 0 to 1 percent slopes
793	Bertrand silt loam, 0 to 2 percent slopes
793B	Bertrand silt loam, 2 to 5 percent slopes
795D2	Ashgrove silty clay loam, 9 to 14 percent slopes, moderately eroded
826	Rowley silt loam, 0 to 2 percent slopes
834	Titus silty clay loam, 0 to 2 percent slopes
893D2	Gara-Rinda complex, 9 to 14 percent slopes, moderately eroded
916B	Downs silt loam, sandy substratum, 2 to 5 percent slopes
916C2	Downs silt loam, sandy substratum, 5 to 9 percent slopes, moderately eroded
917B	Fayette silt loam, sandy substratum, 2 to 5 percent slopes
917C2	Fayette silt loam, sandy substratum, 5 to 9 percent slopes, moderately eroded
925	Toolesboro loam, 0 to 2 percent slopes
960	Shaffton loam, 0 to 2 percent slopes
961	Ambraw loam, 0 to 2 percent slopes
1058E	Douds-Lindley loams, 14 to 18 percent slopes
1058F	Douds-Lindley loams, 18 to 25 percent slopes
1058G	Douds-Lindley loams, 25 to 40 percent slopes
1220	Nodaway silt loam, channeled, 0 to 2 percent slopes
1484	Lawson silt loam, channeled, 0 to 2 percent slopes
1539	Coland-Perks-Lawson complex, frequently flooded, 0 to 2 percent slopes
1730B	Nodaway-Klum complex, channeled, 0 to 5 percent slopes
3133	Colo silty clay loam, rarely flooded, 0 to 2 percent slopes
3133+	Colo loamy sand, overwash, 0 to 2 percent slopes
3539	Perks sandy loam, rarely flooded, 0 to 3 percent slopes
3834	Titus silty clay loam, rarely flooded, 0 to 2 percent slopes
3960	Shaffton loam, rarely flooded, 0 to 2 percent slopes
3961	Ambraw loam, rarely flooded, 0 to 2 percent slopes
5010	Pits, sand and gravel
5030	Pits, limestone quarry

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Reservation (national forest or park, state forest or park, and large airport)
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, or cemetery — Davis Airstrip

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads

ROAD EMBLEMS & DESIGNATIONS

- Federal — 410
- State — 52

RAILROAD

LEVEES

- Without road
- With road

DAMS

- Large (to scale)
- Medium or small — water; w

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water; w
- Intermittent — int; i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Wet spot
- Sewage lagoon — S.L.

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 120B 119

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown) — S

MISCELLANEOUS (each symbol represents 2 acres or less)

- Blowout
- Clay spot
- Gravelly spot
- Dumps and other similar non soil areas
- Rock outcrop (includes sandstone and shale)
- Sandy spot
- Severely eroded spot
- Red clay area
- Light colored silty deposition
- Muck spot
- Wet clayey depression
- Borrow area
- Glacial till outcrop

LOUISA COUNTY, IOWA NO. 1

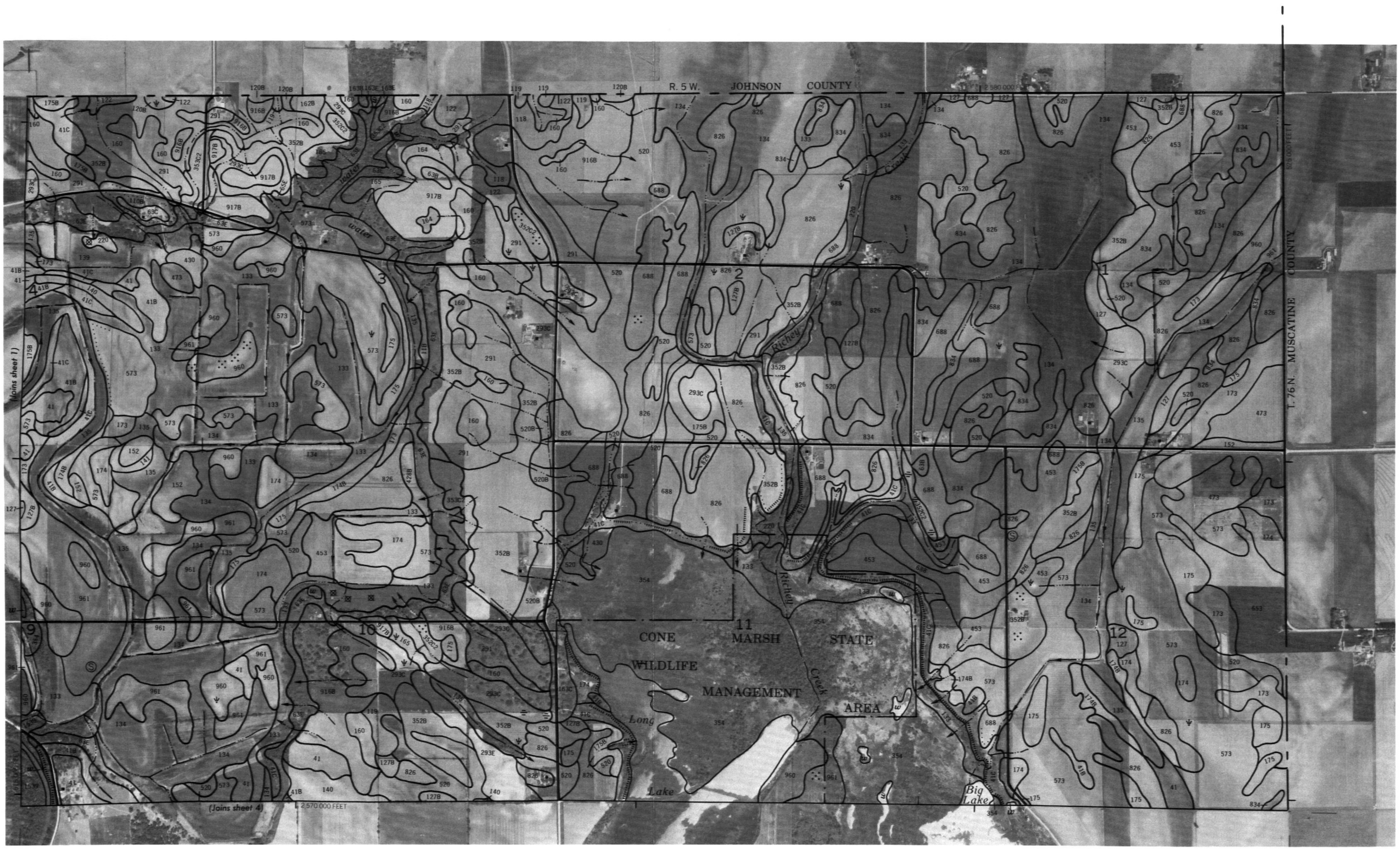
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA — SHEET NUMBER 2

2

N

1 Mile
5 000 Feet
Scale 1:15 840

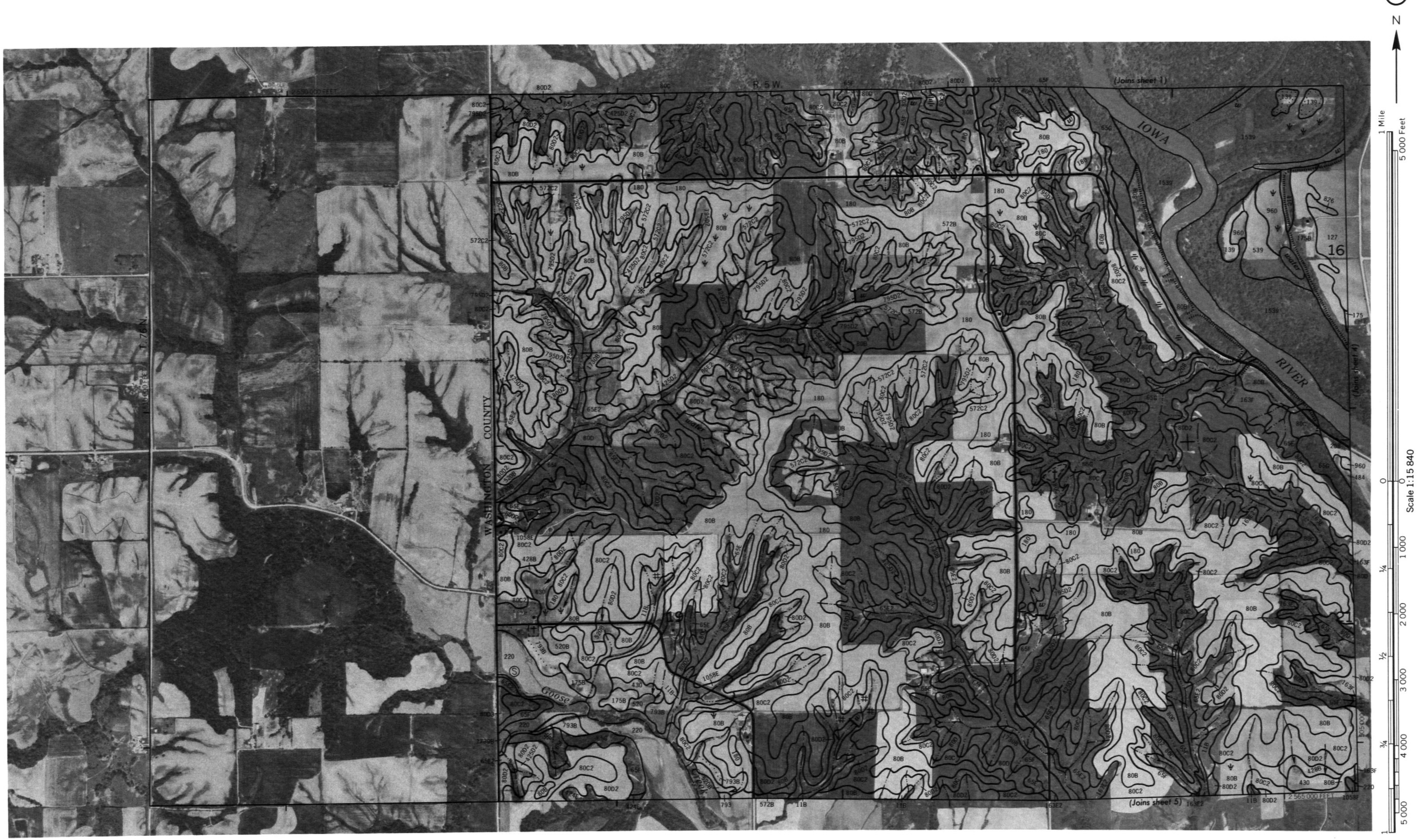


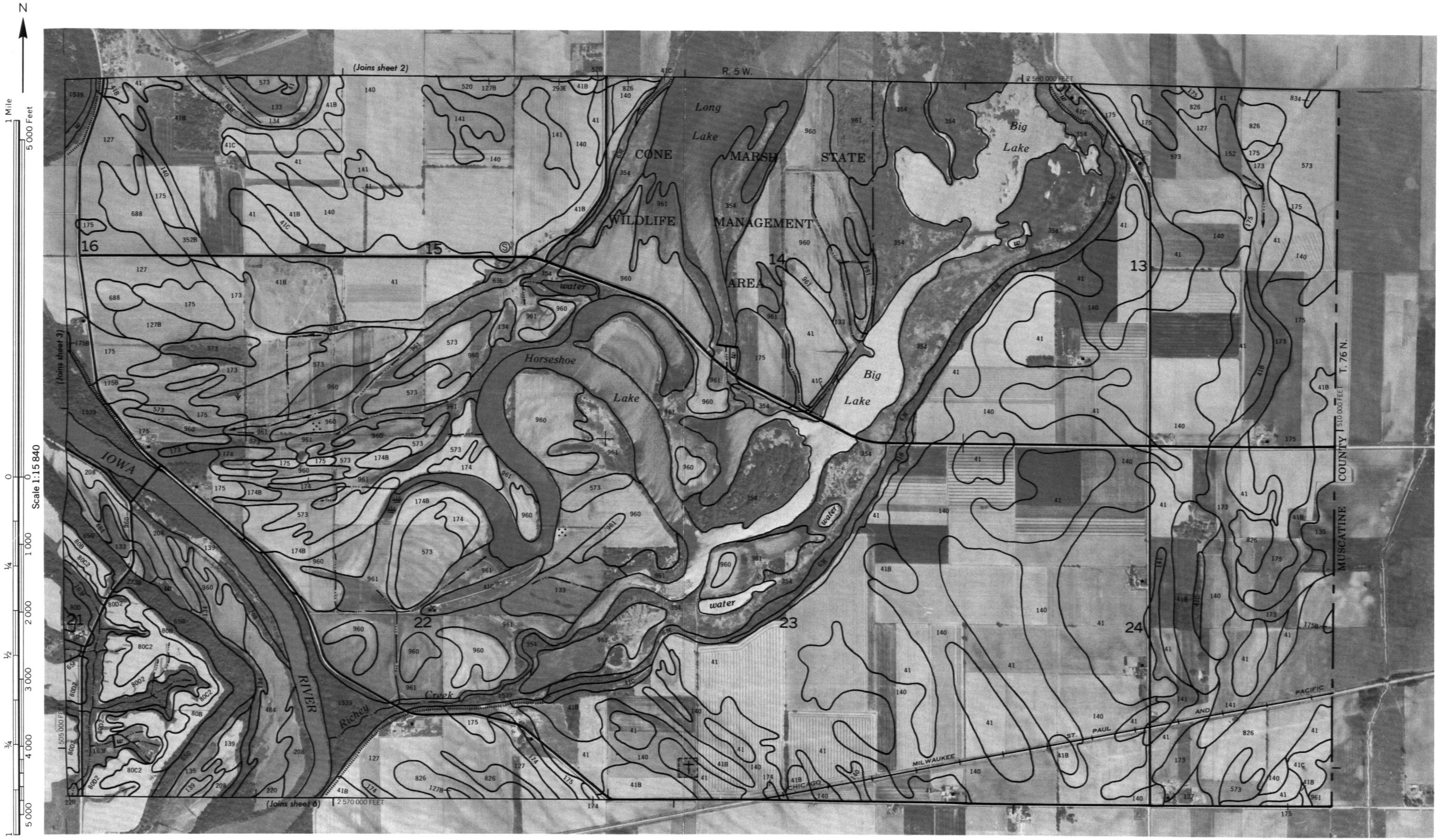
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 2

LOUISA COUNTY, IOWA NO. 3

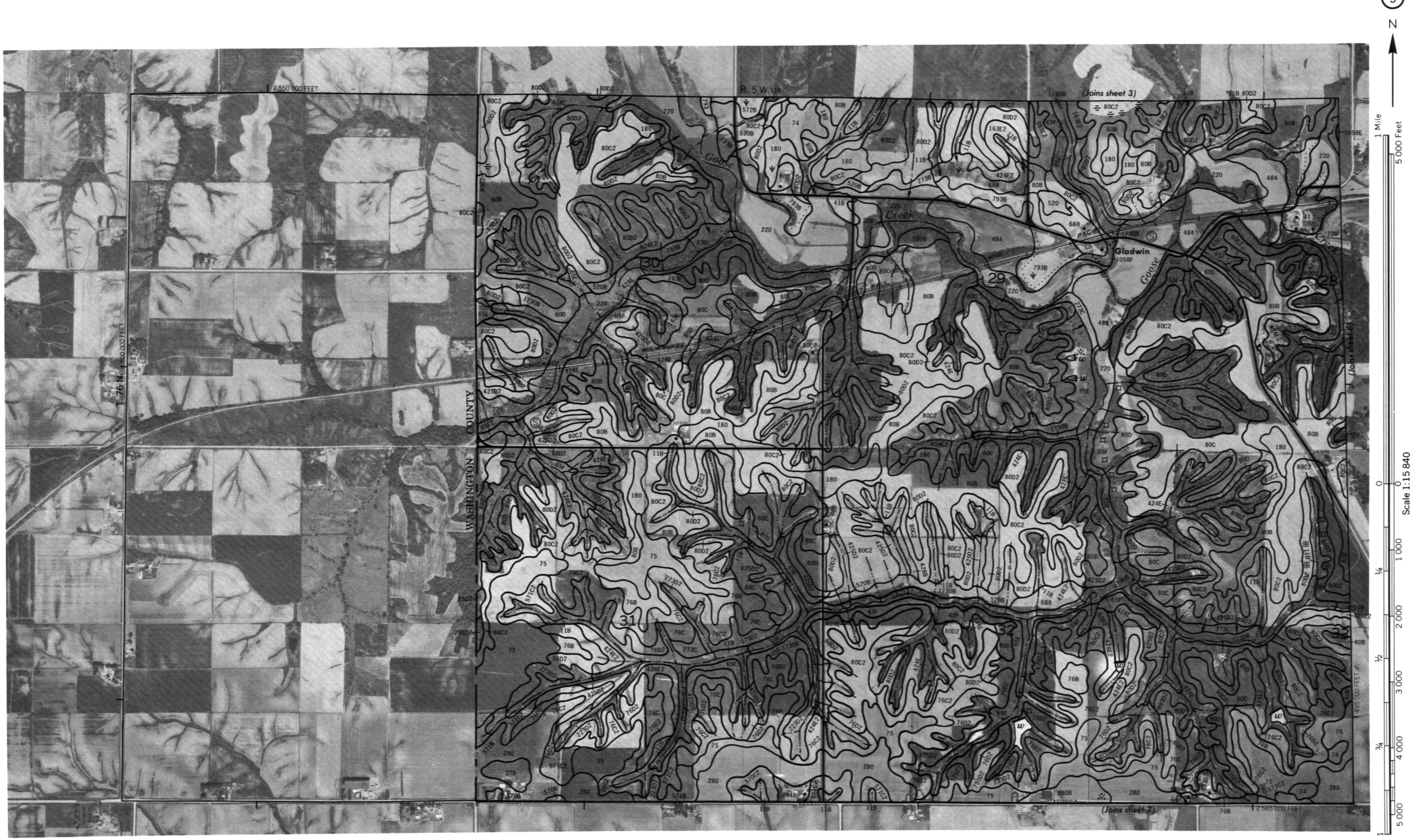
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.





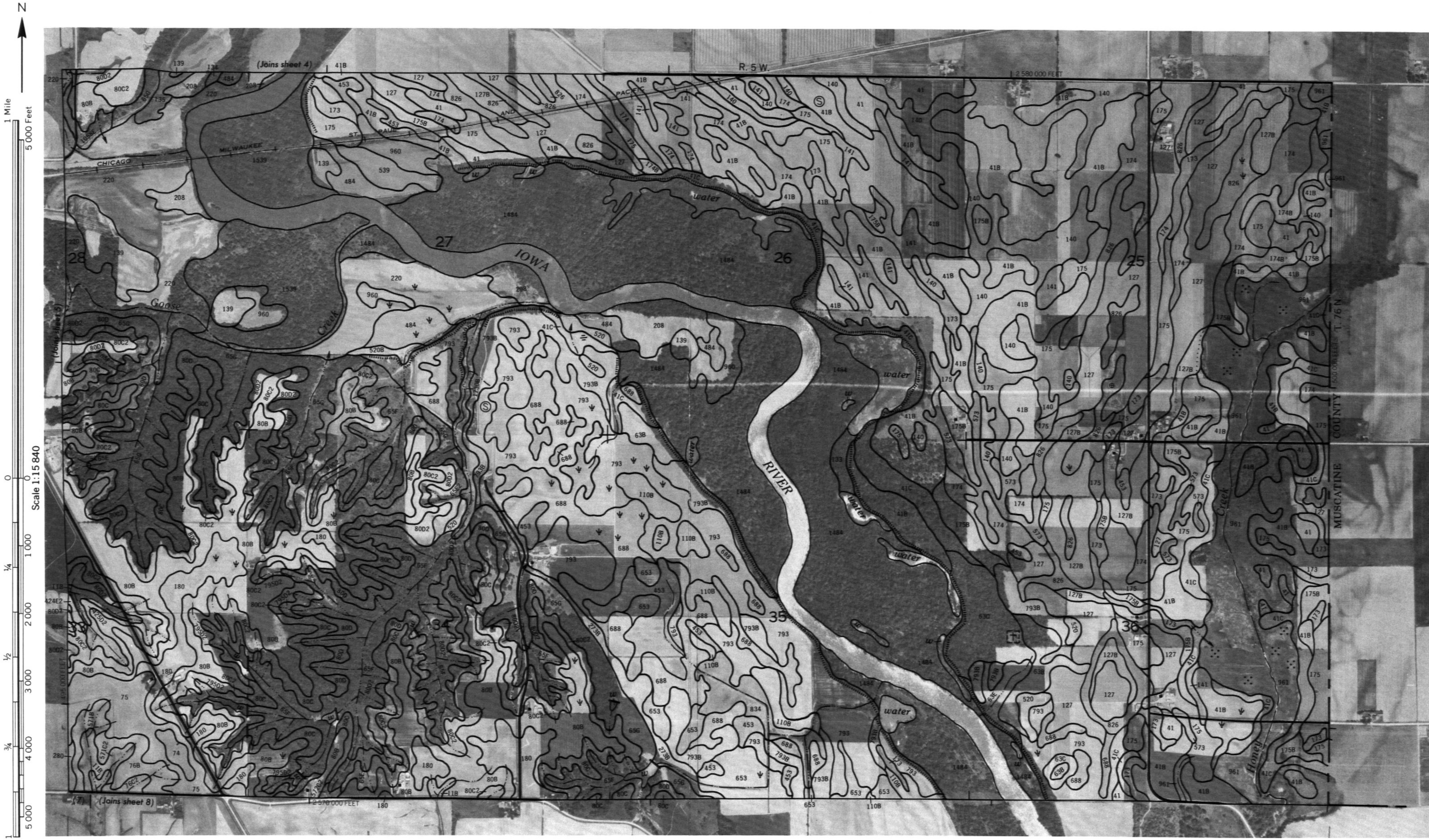
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 4



LOUISA COUNTY, IOWA NO. 5

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

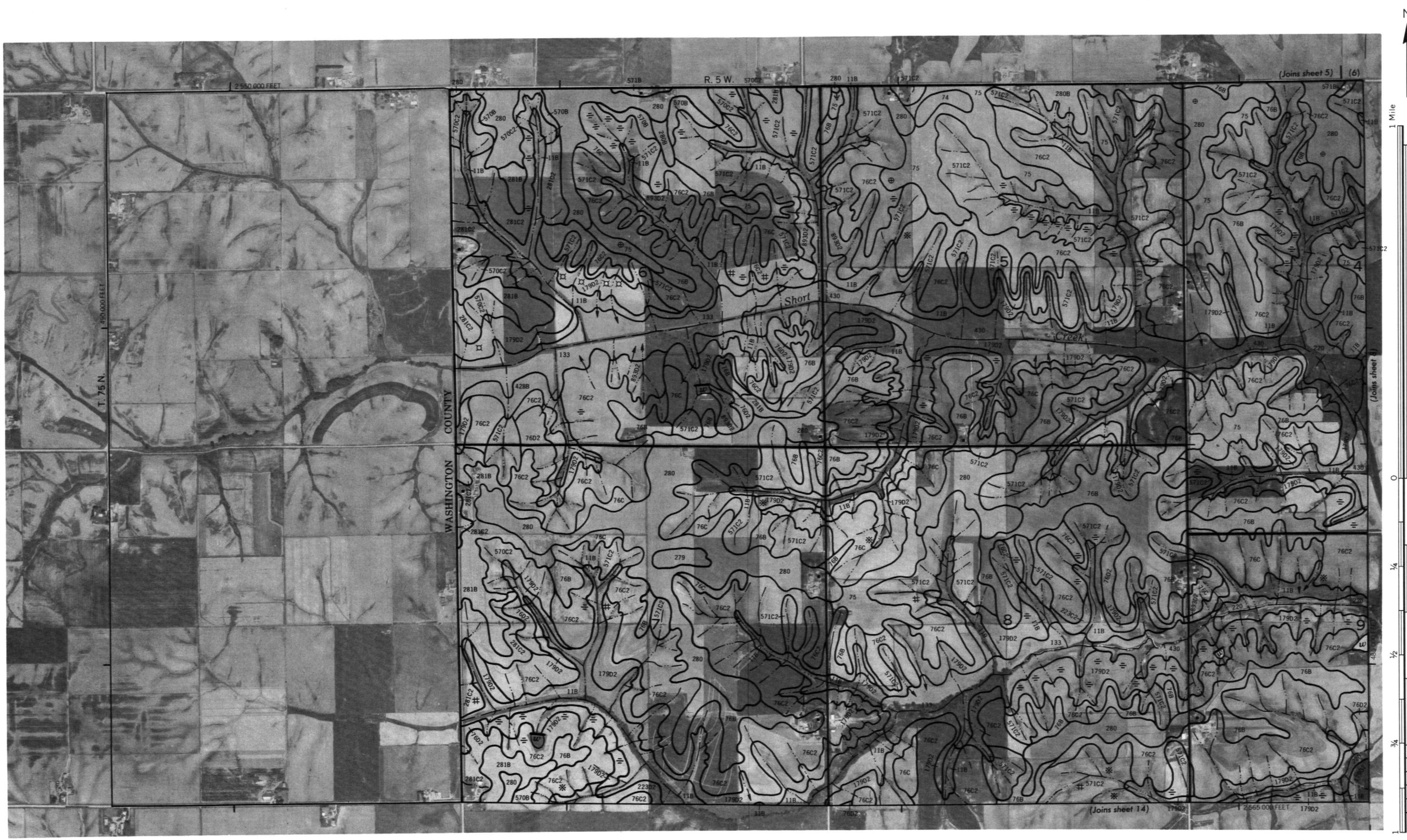


This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 6

LOUISA COUNTY, IOWA NO. 7

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



N

1 Mile

5 000 Feet

Scale 1:15 840

0 1 000 2 000 3 000 4 000 5 000

0 ¼ ½ ¾ 1

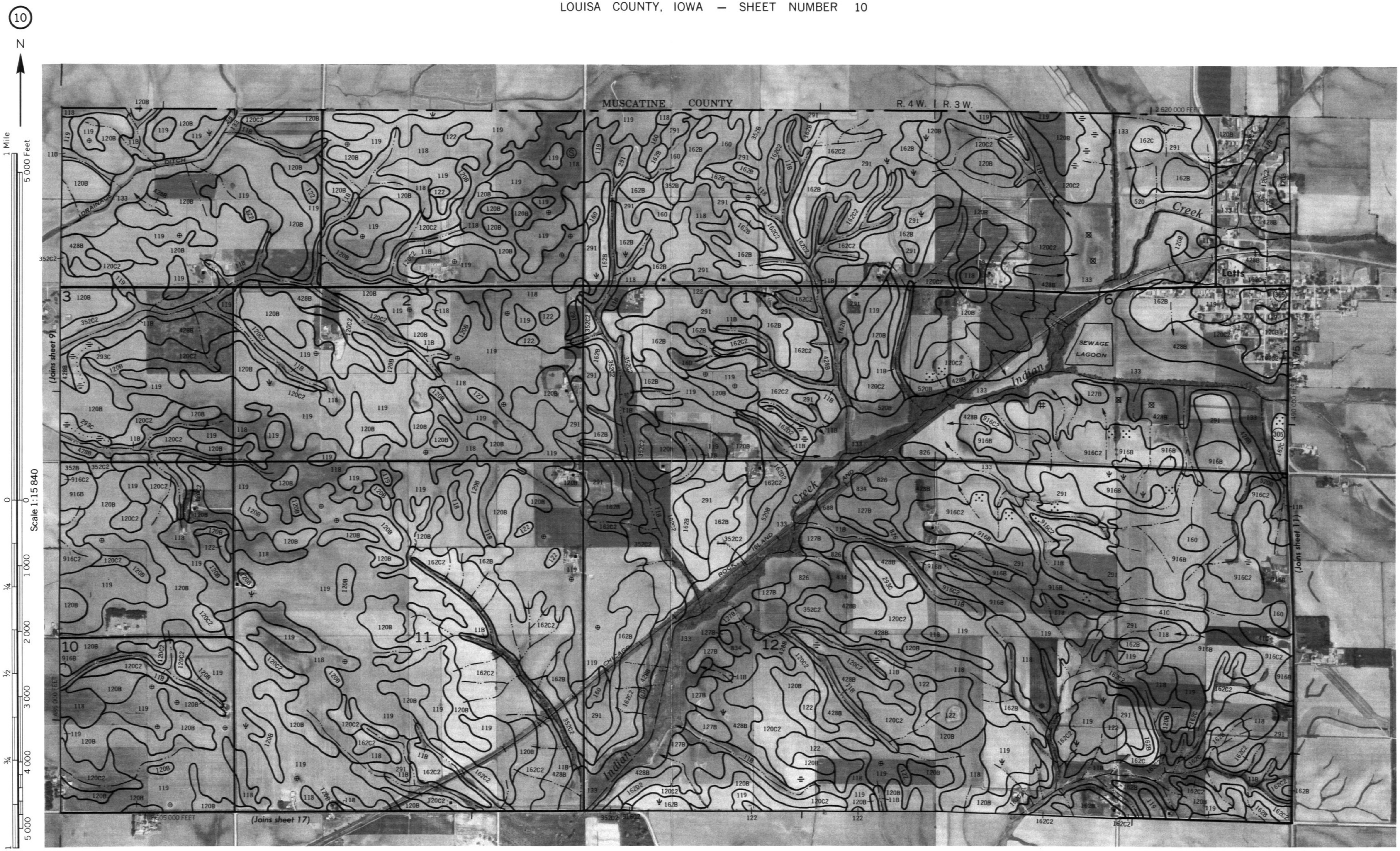
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

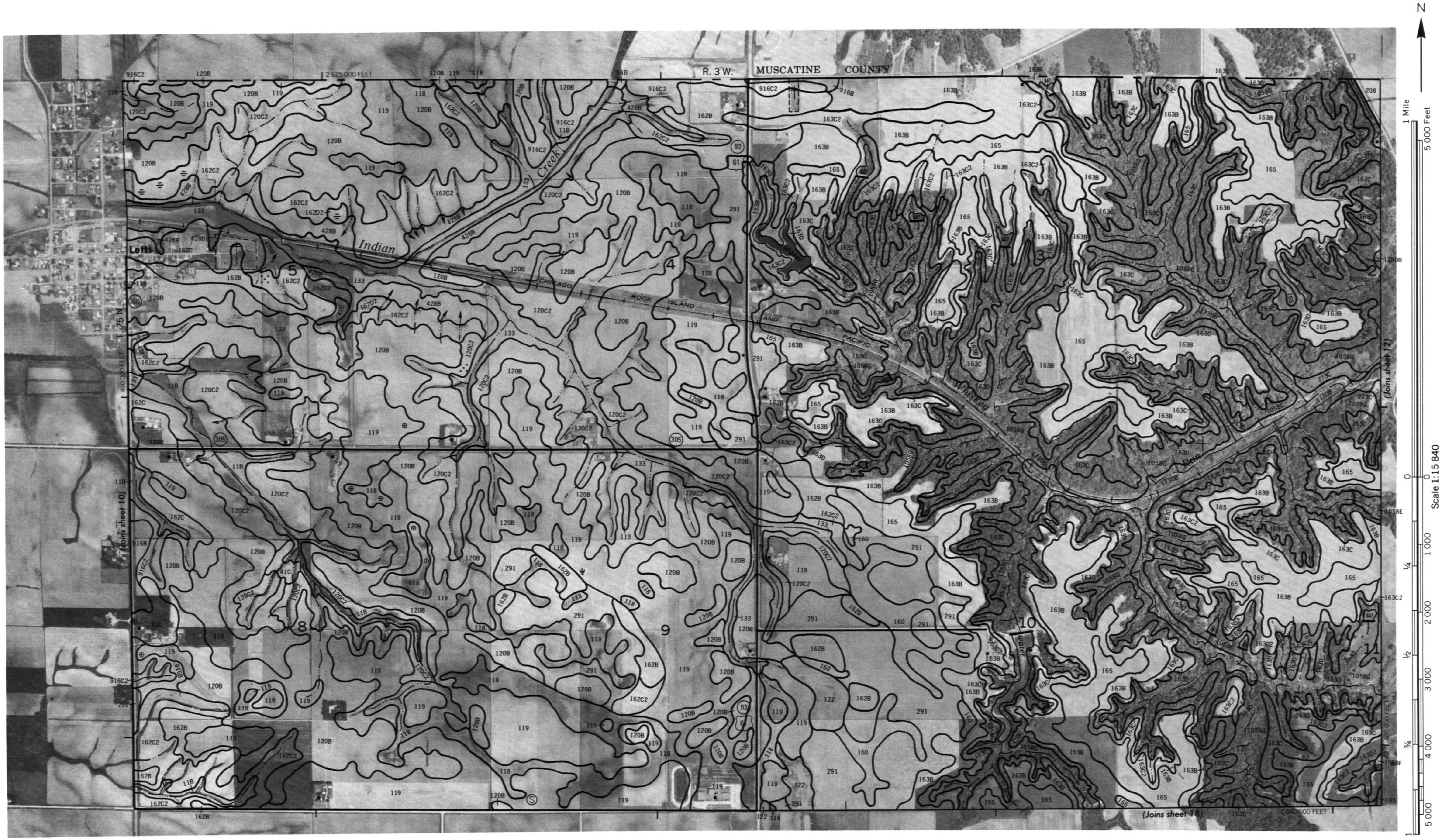
LOUISA COUNTY, IOWA NO. 9

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 Mile
5 000 Feet
Scale 1:15 840
0 ¼ ½ ¾ 1
0 1000 2000 3000 4000 5000



This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



LOUISA COUNTY, IOWA NO. 11

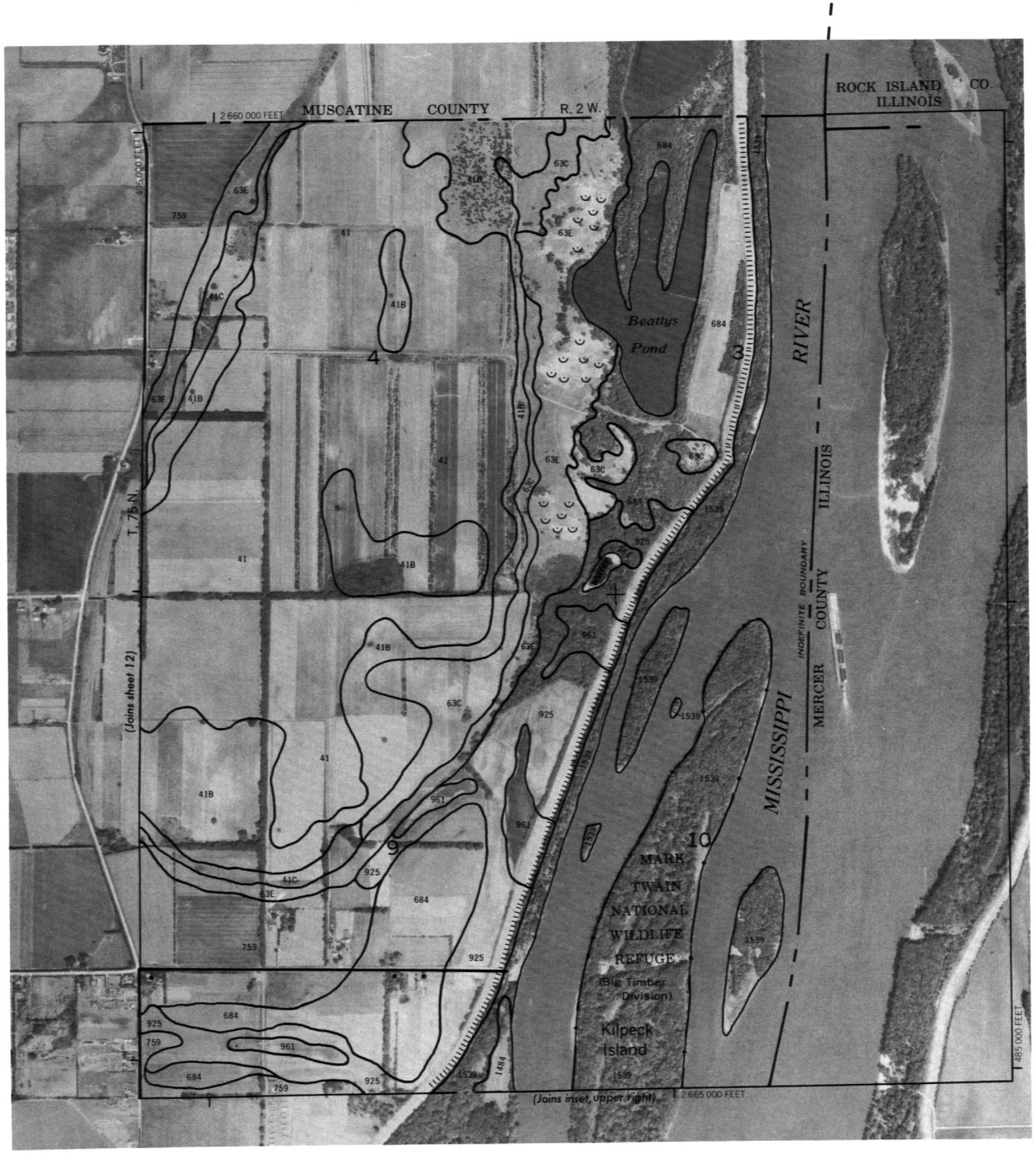
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

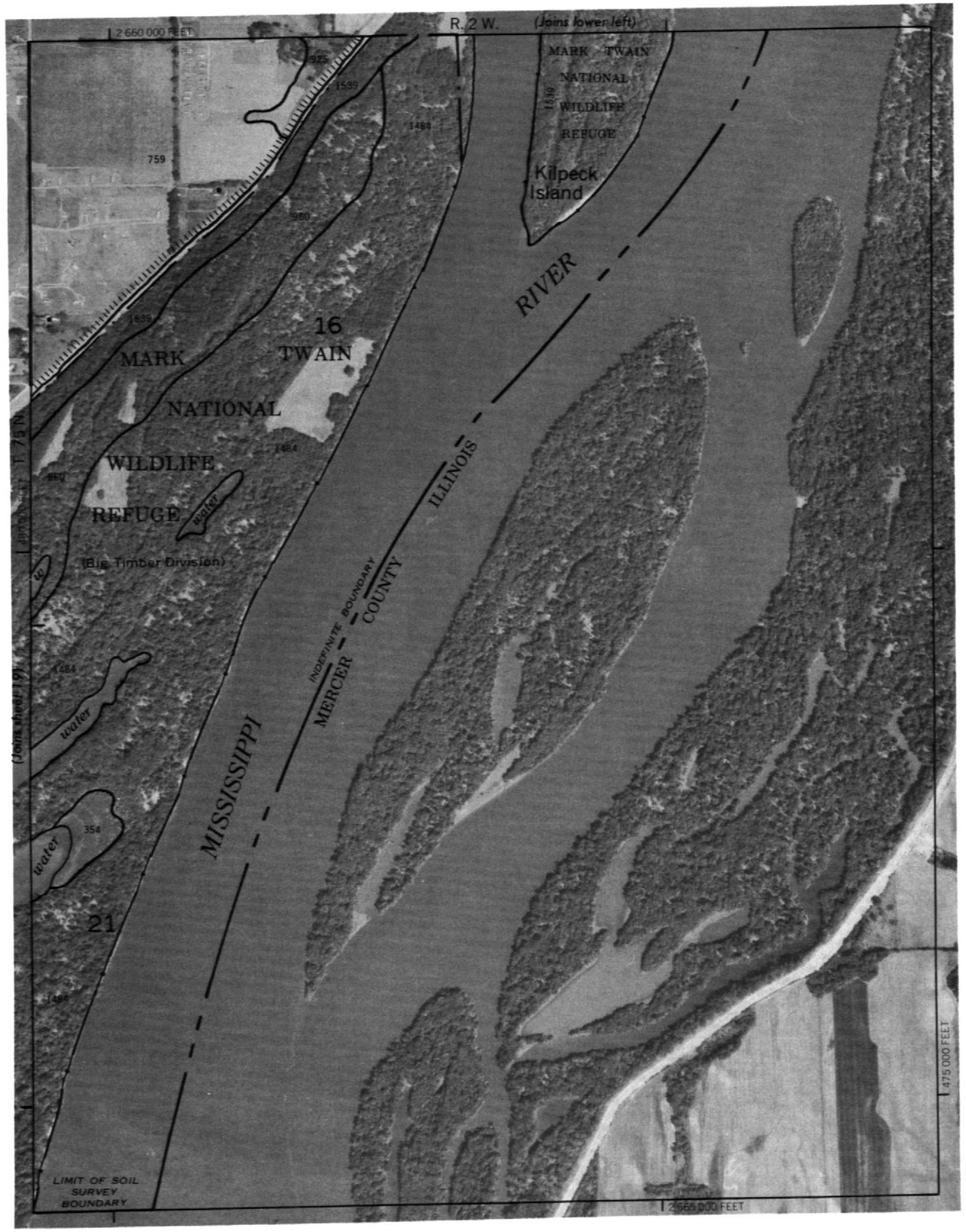
(12)

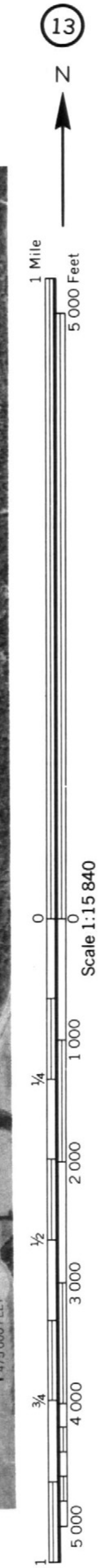
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 13

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.







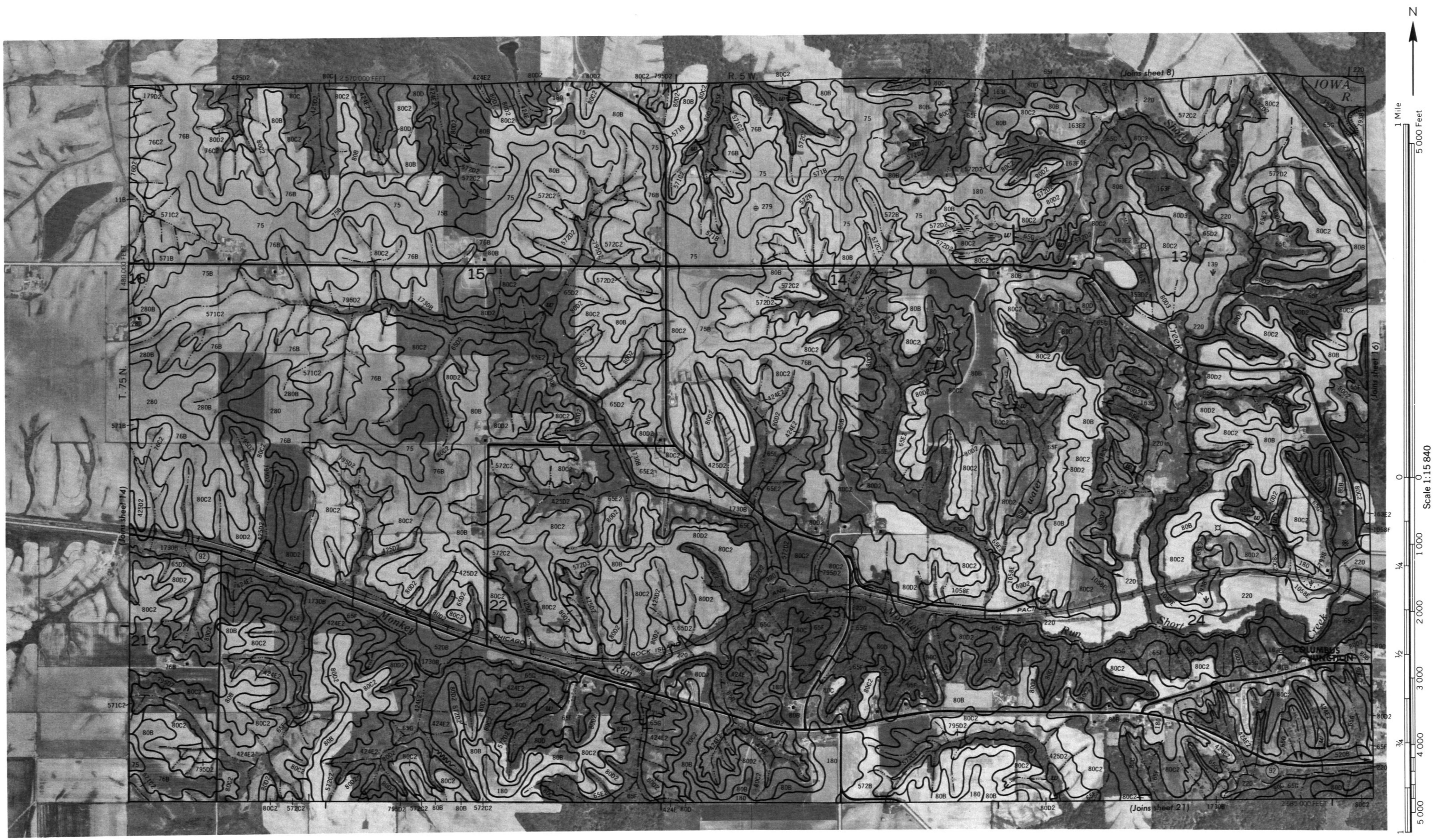
LOUISA COUNTY, IOWA — SHEET NUMBER 14

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 14

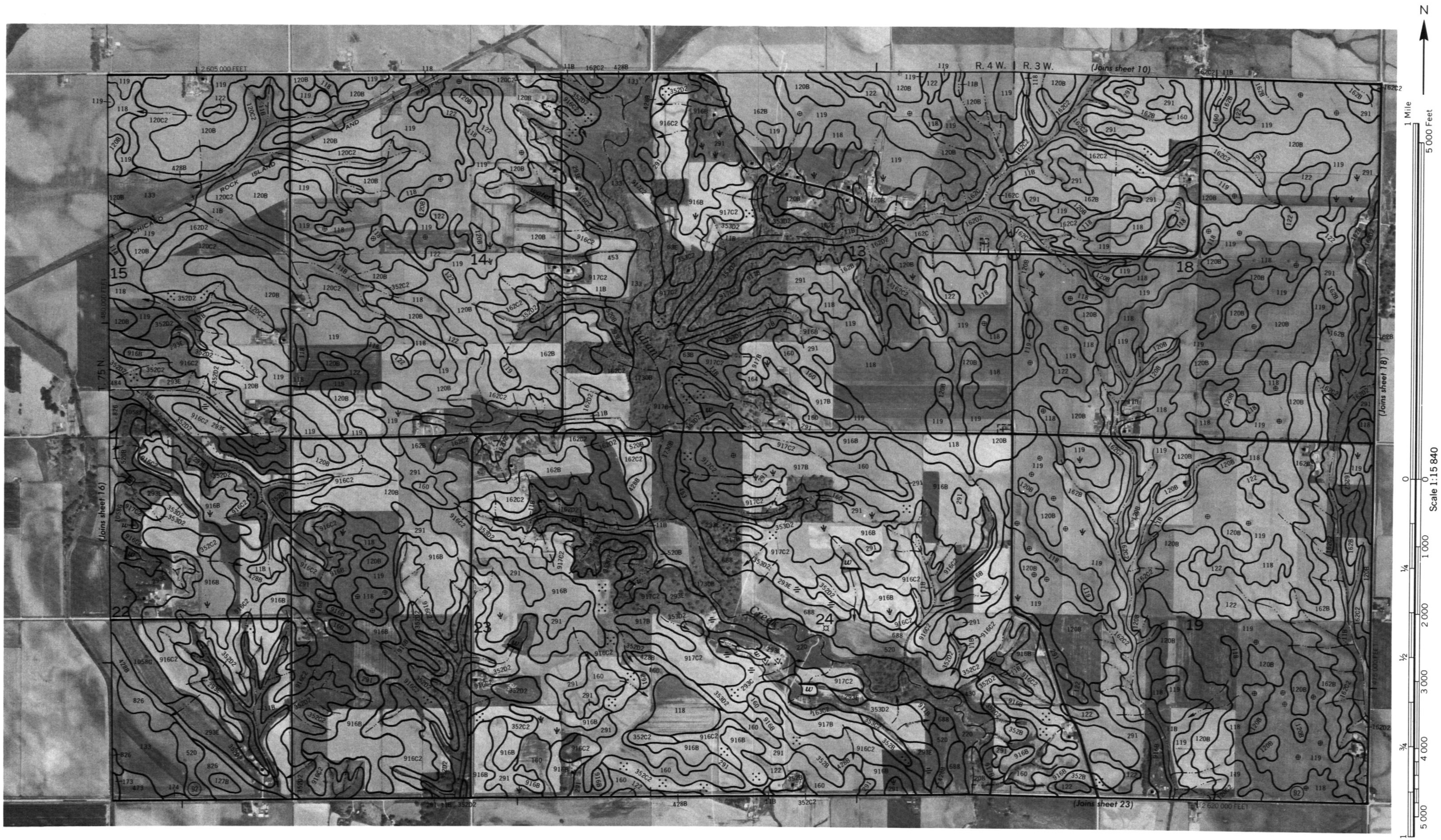
LOUISA COUNTY, IOWA NO. 15

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



(16)

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



LOUISA COUNTY, IOWA NO. 17

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

18

N

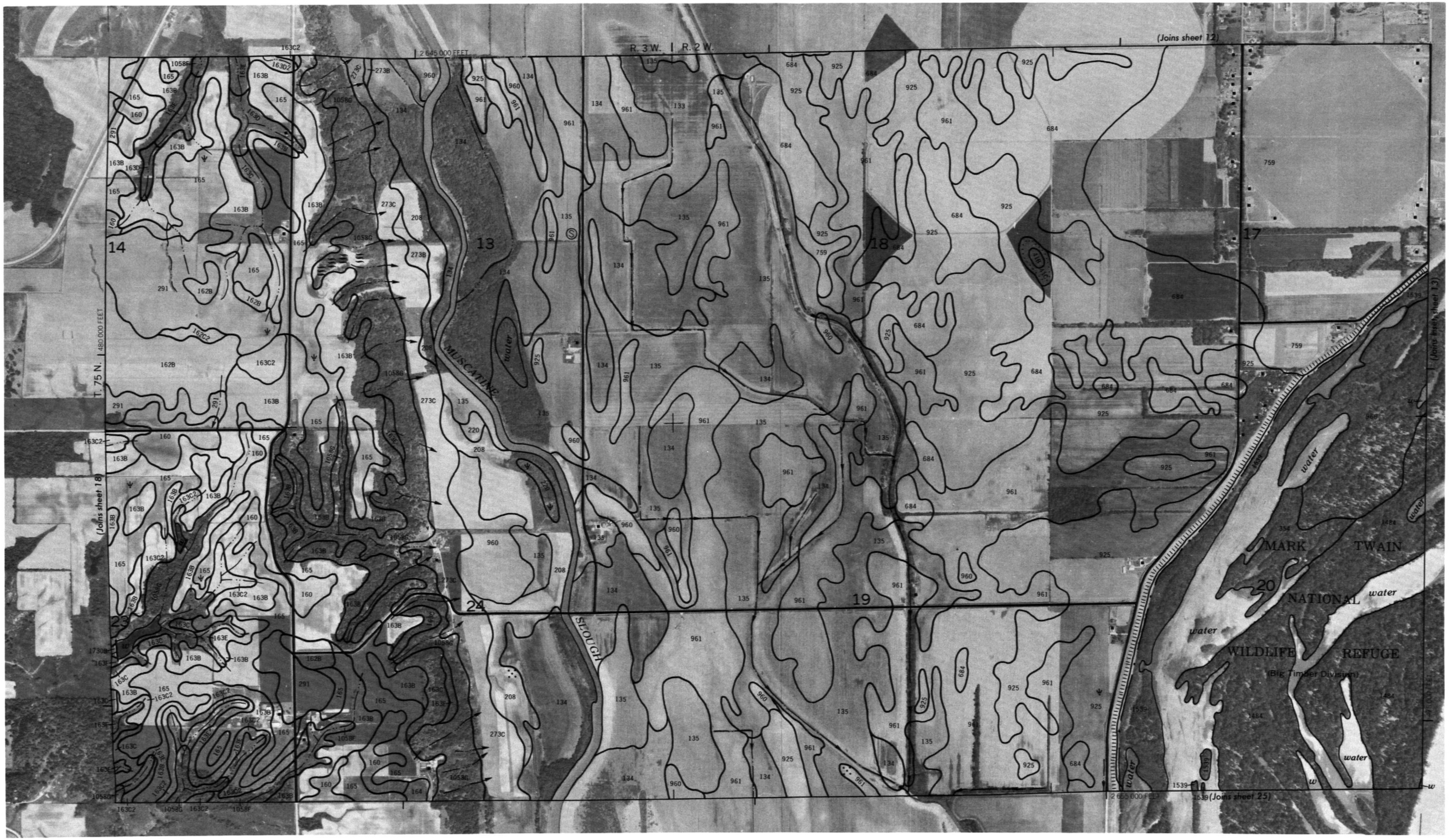
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
¼
2 000
½
3 000
¾
4 000
5 000

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 18

19

N



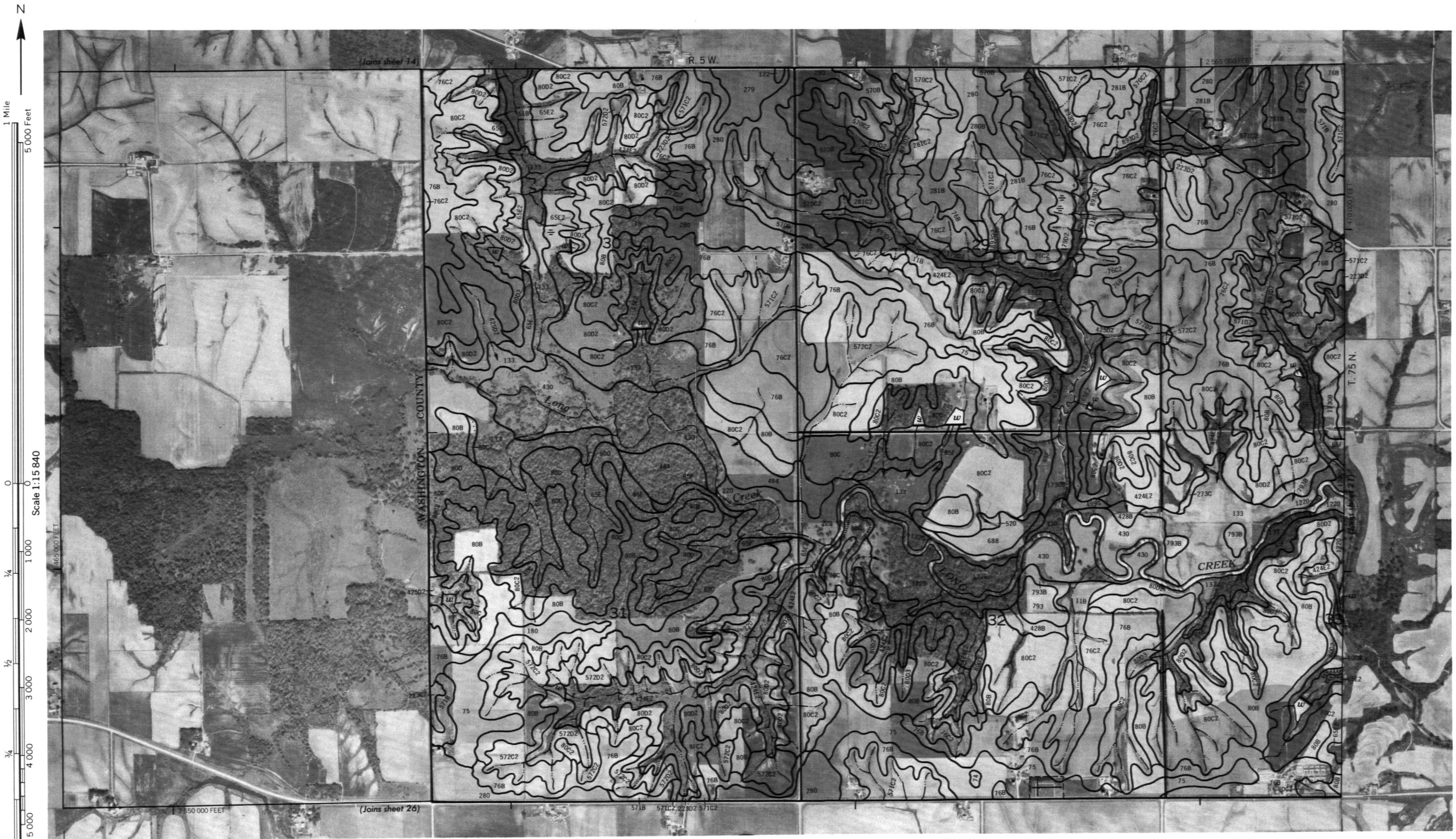
LOUISA COUNTY, IOWA NO. 19

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 Mile

5 000 Feet

Scale 1:15 840



This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

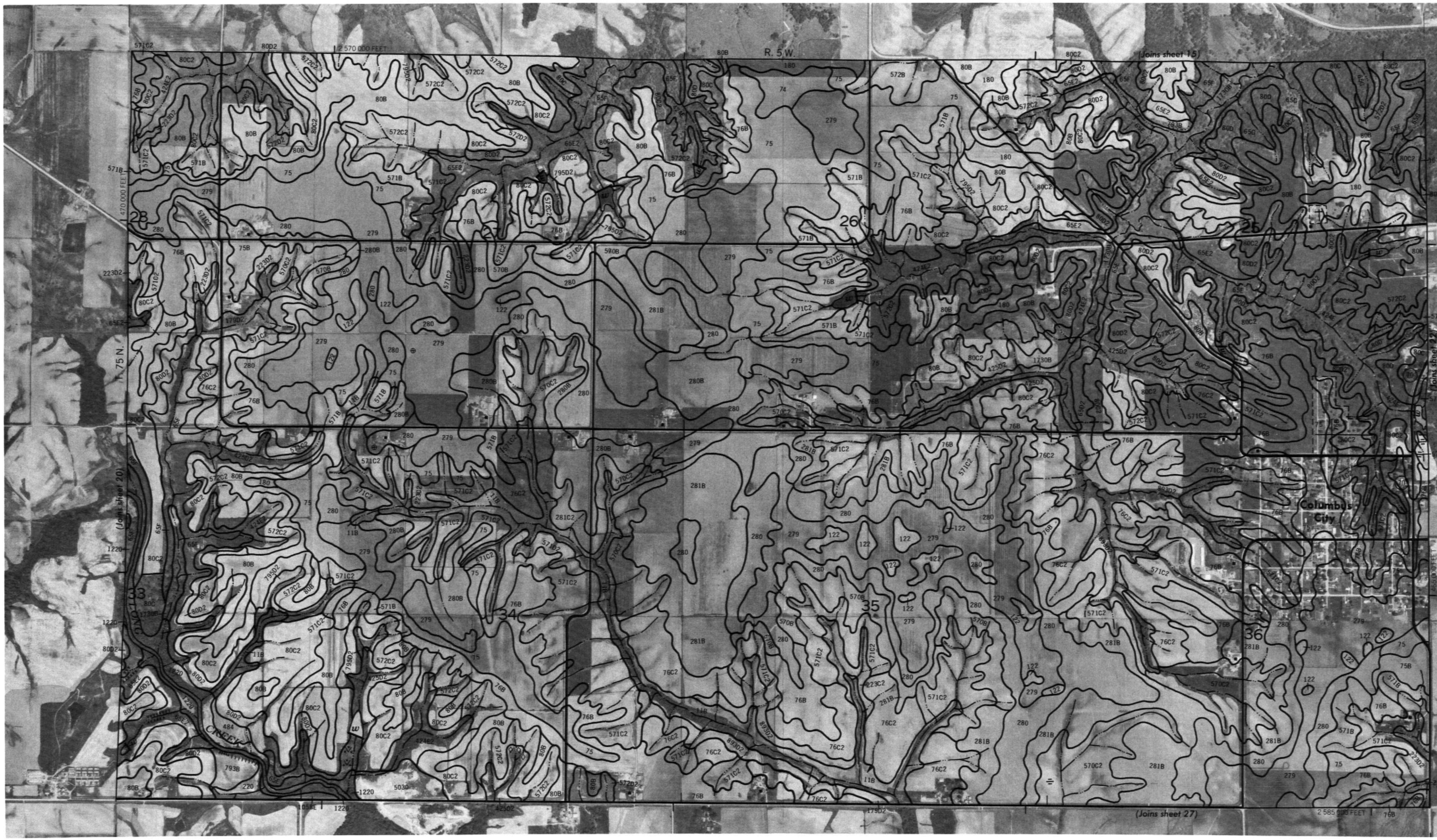
LOUISA COUNTY, IOWA NO. 20

21

N

LOUISA COUNTY, IOWA NO. 21

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1
0
1 000
2 000
3 000
4 000
5 000

22

N

1 Mile

5 000 Feet

Scale 1:15 840

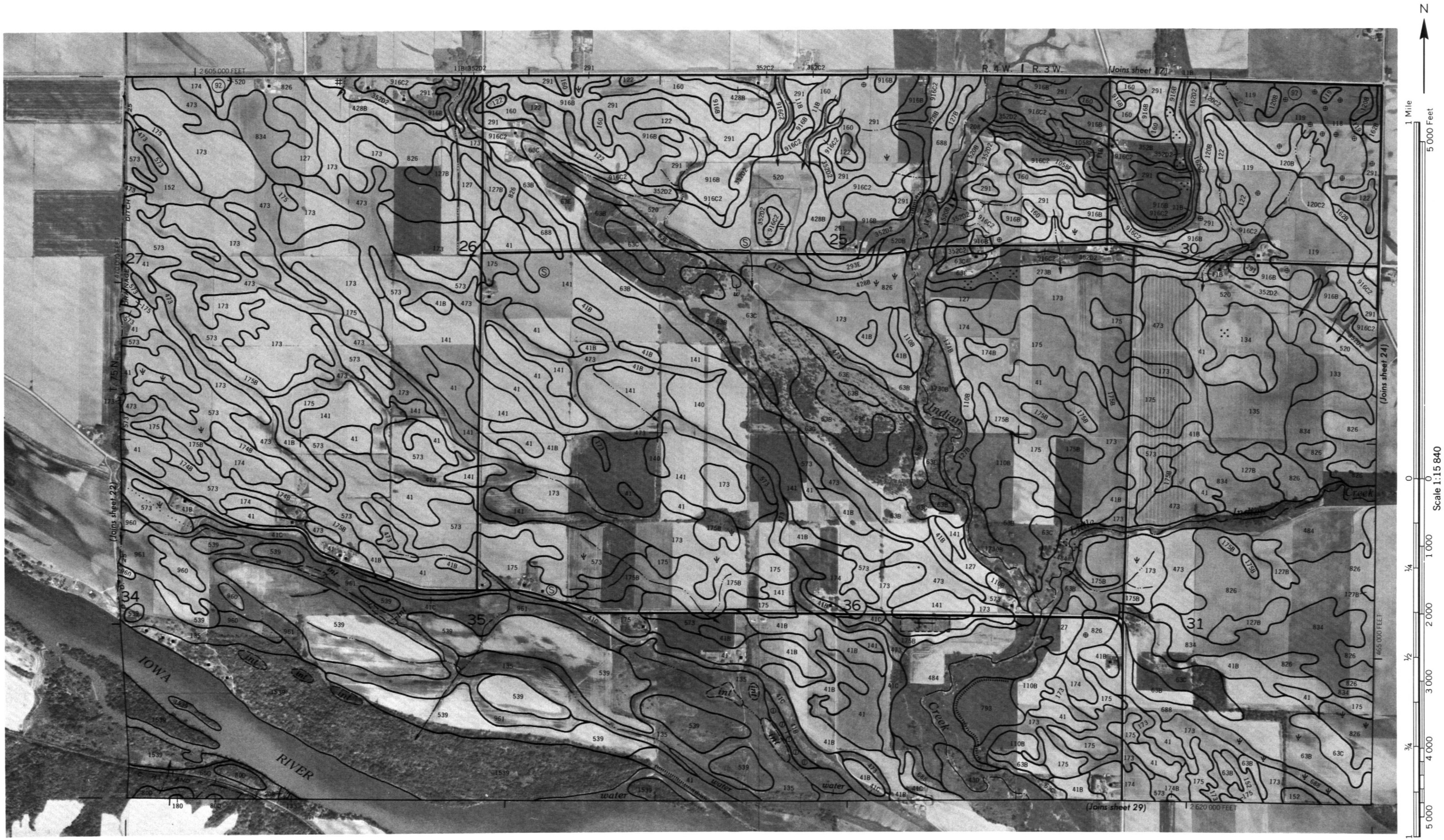
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 22

23

LOUISA COUNTY, IOWA NO. 23

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



LOUISA COUNTY, IOWA — SHEET NUMBER 24

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

LOUISA COUNTY, IOWA NO. 25

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

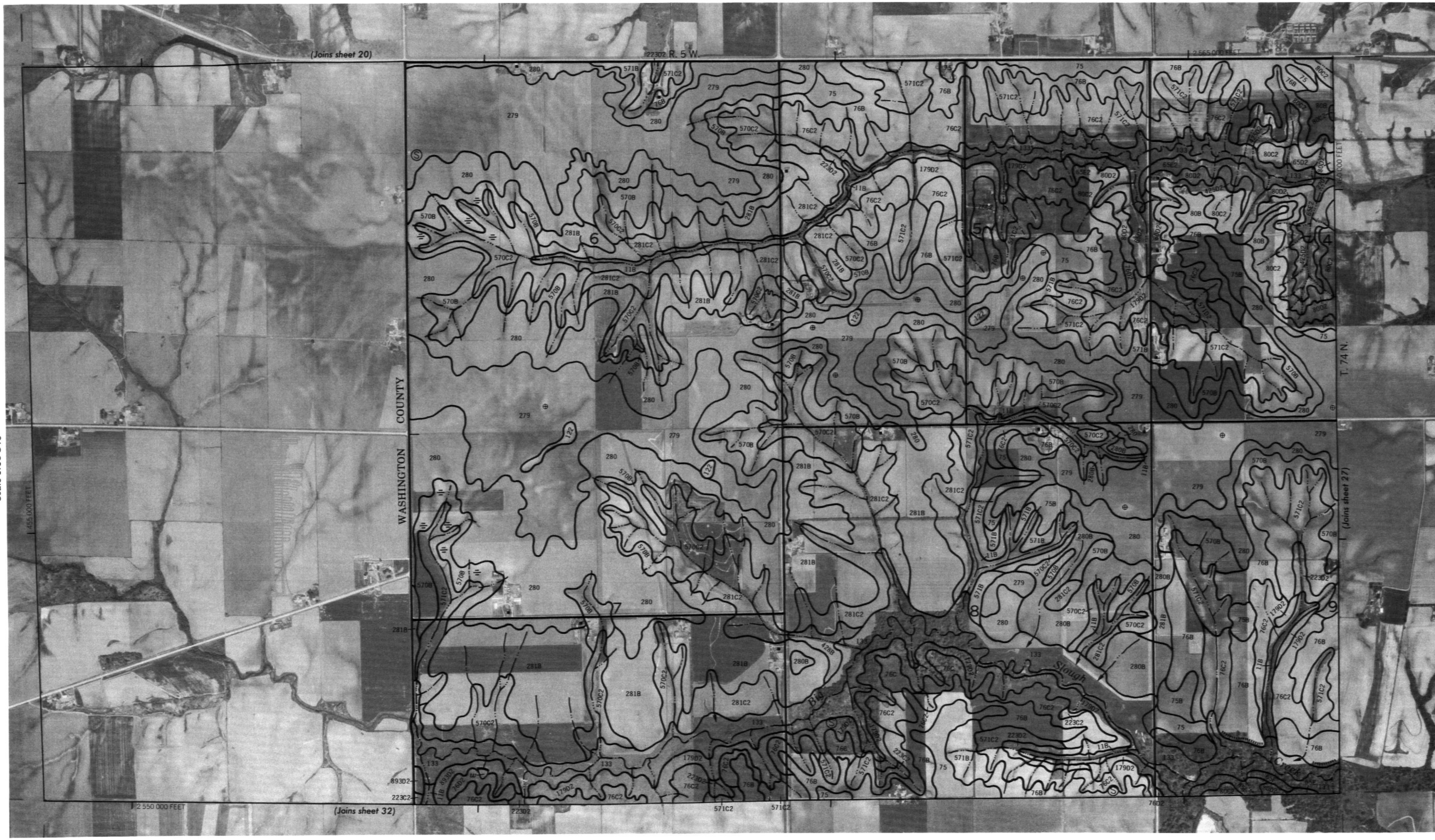
Scale 1:15 840

1 Mile
0 ¼ ½ ¾

5 000 Feet
0 1000 2000 3000 4000 5000

26

N



1 Mile
5 000 Feet
Scale 1:15 840
0 · 1 000 · 2 000 · 3 000 · 4 000 · 5 000
0 · ¼ · ½ · ¾ · 1

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(27)

LOUISA COUNTY, IOWA NO. 27

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

1 Mile

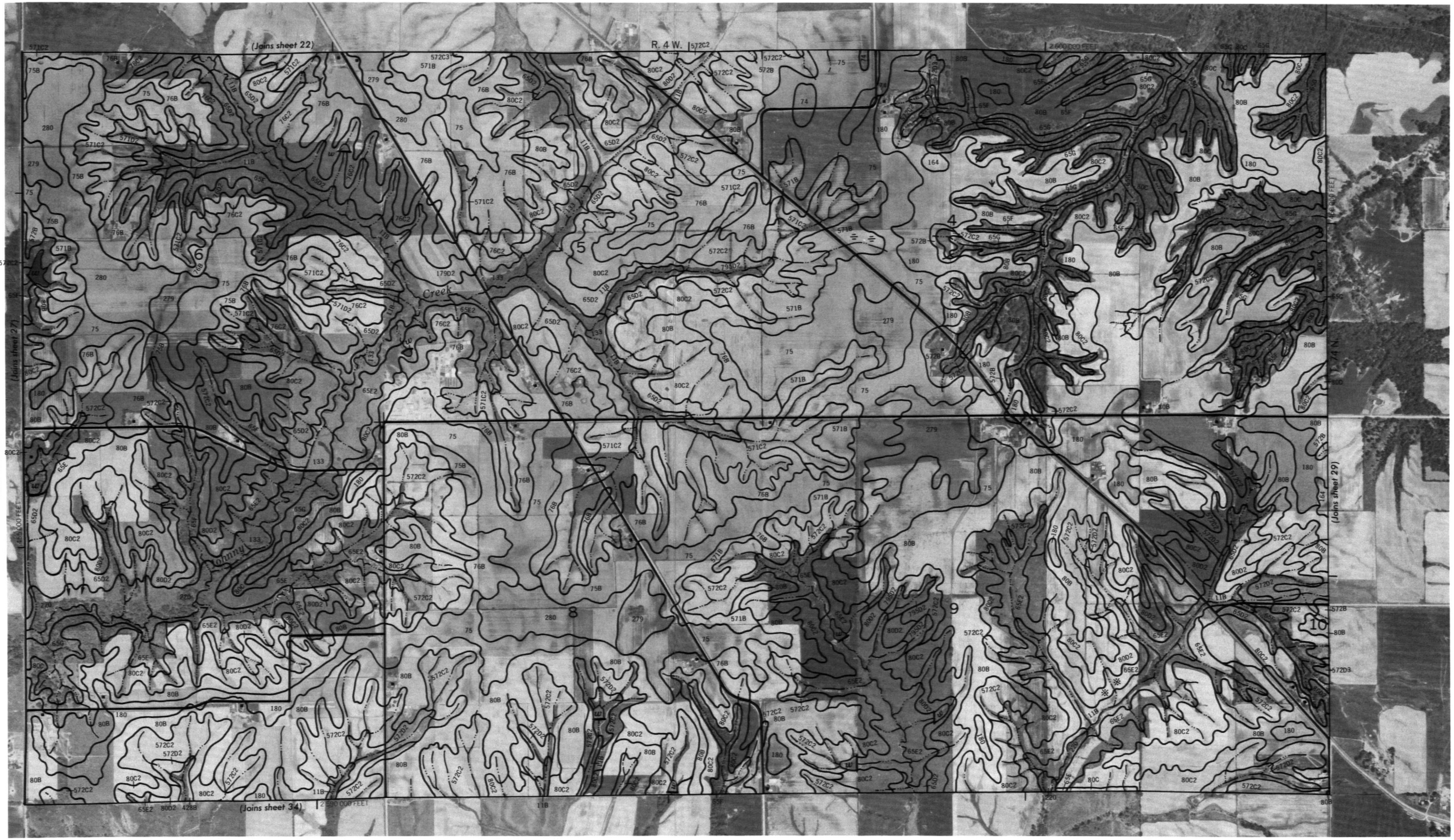
5 000 Feet

Scale 1:15 840

28

N

1 Mile
5 000 Feet
Scale 1:15 840



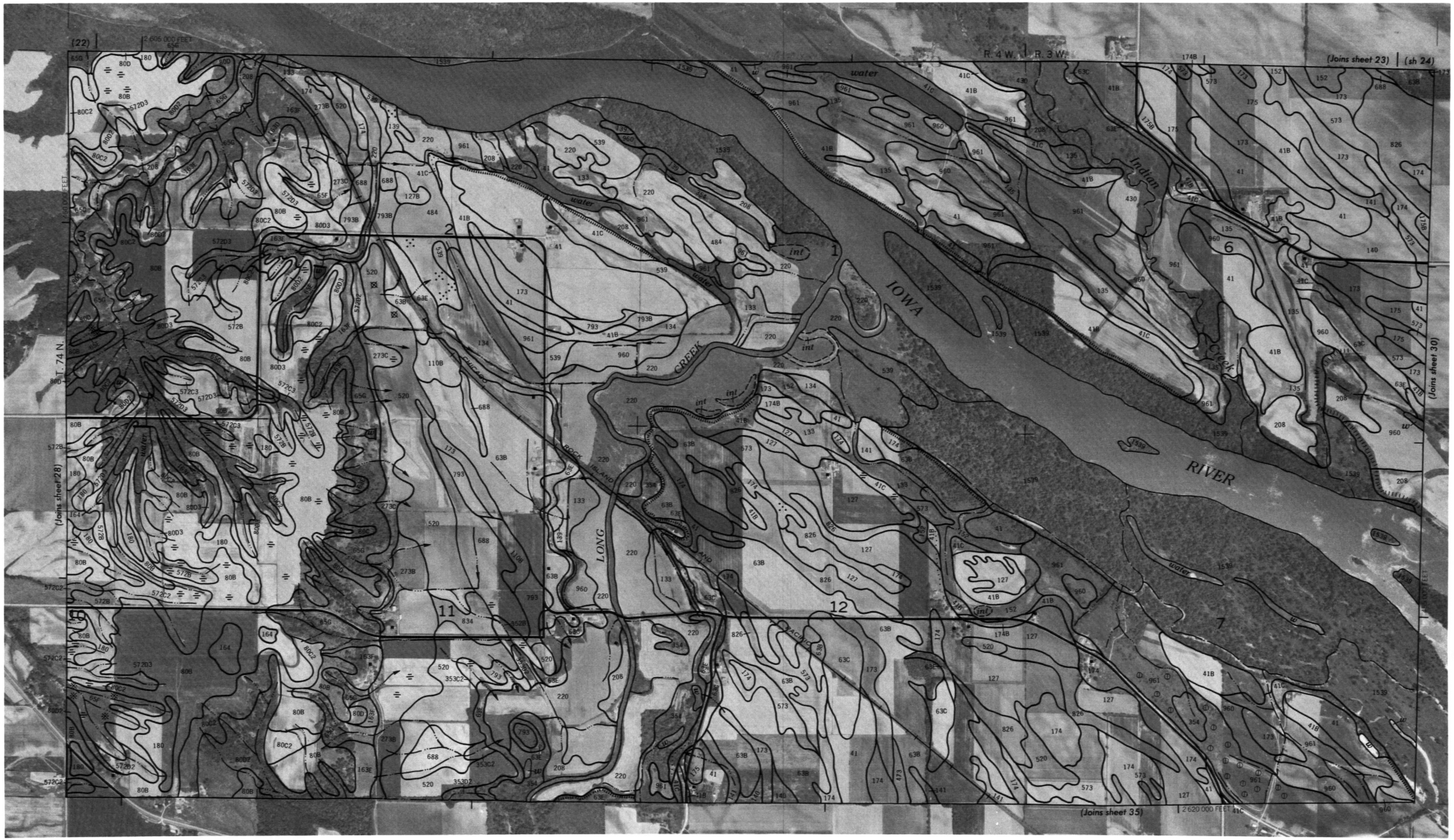
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 28

N

LOUISA COUNTY, IOWA NO. 29

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 Mile

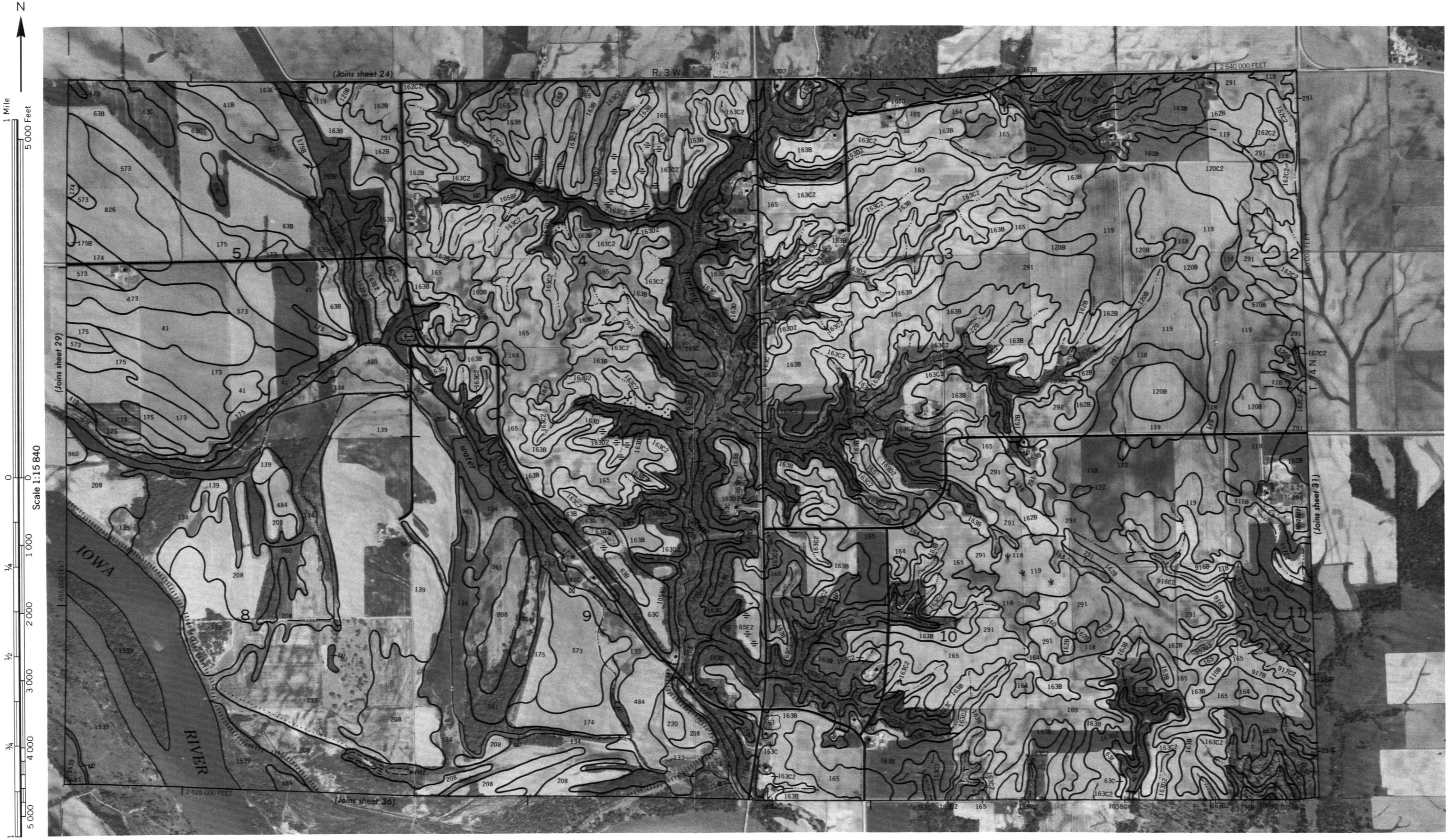
5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

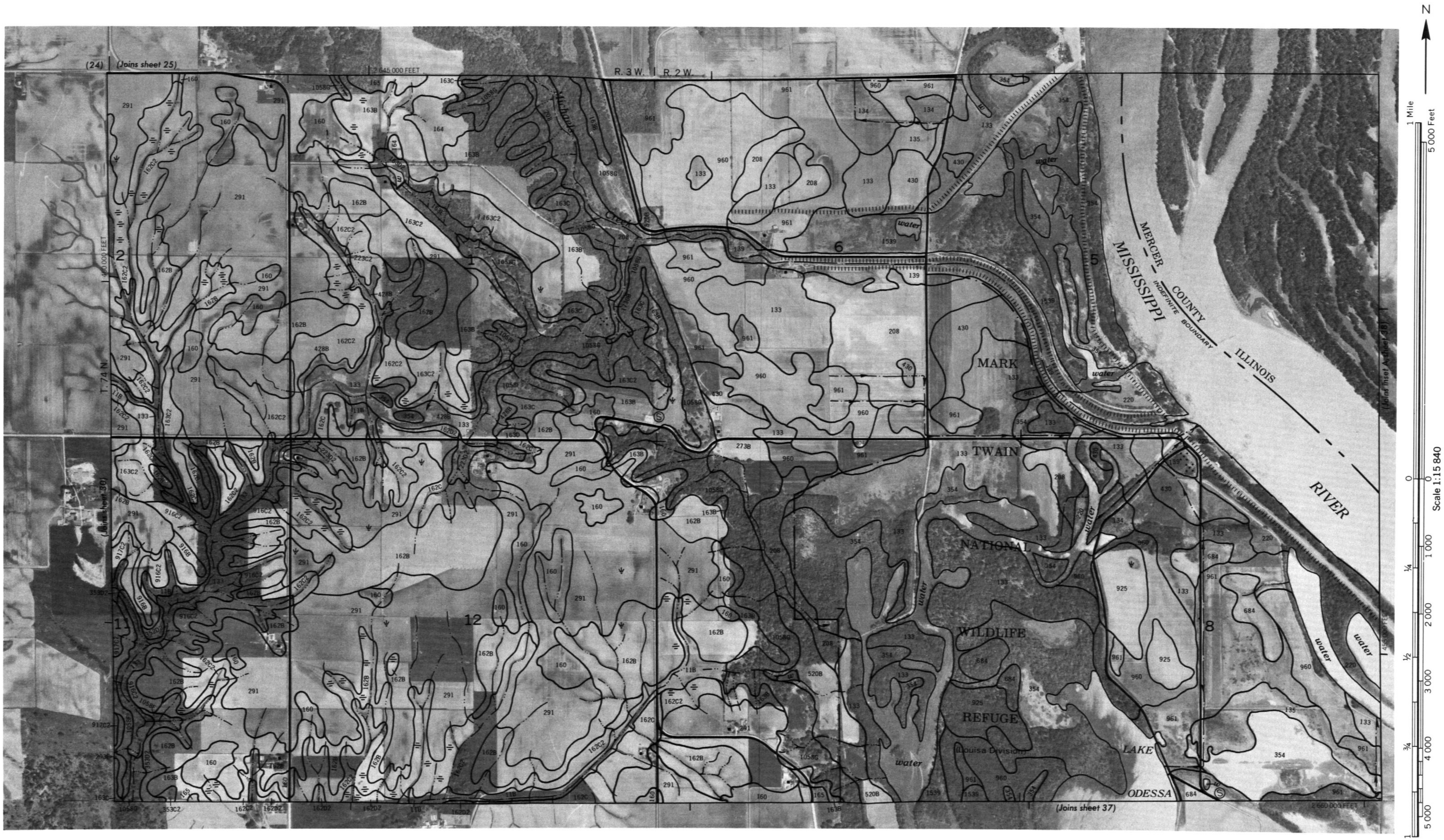
30



This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

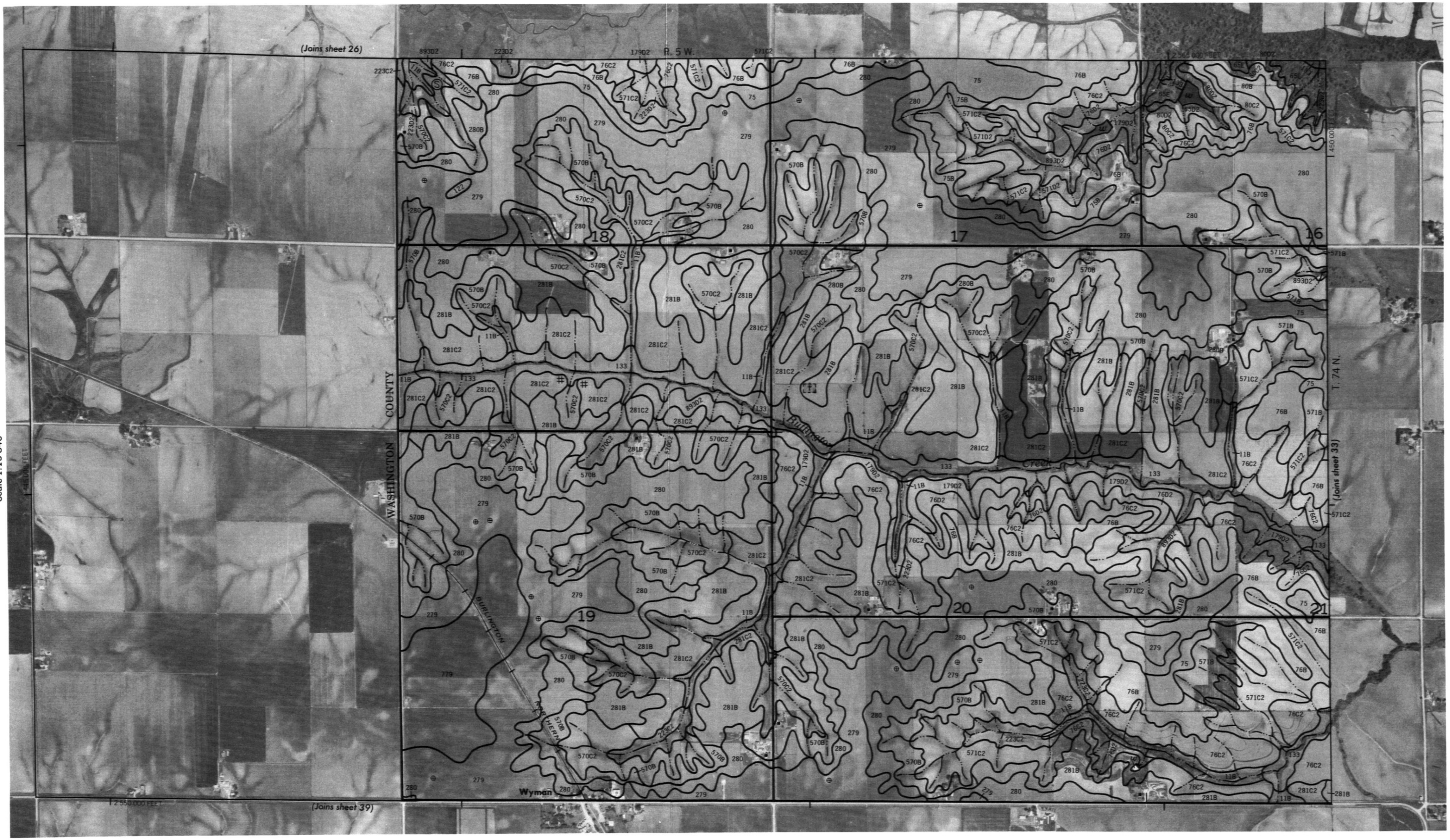
LOUISA COUNTY, IOWA NO. 31

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



32

N



1 Mile
5 000 Feet
Scale 1:15 840
0 ¼ ½ ¾ 1
0 1 000 2 000 3 000 4 000 5 000

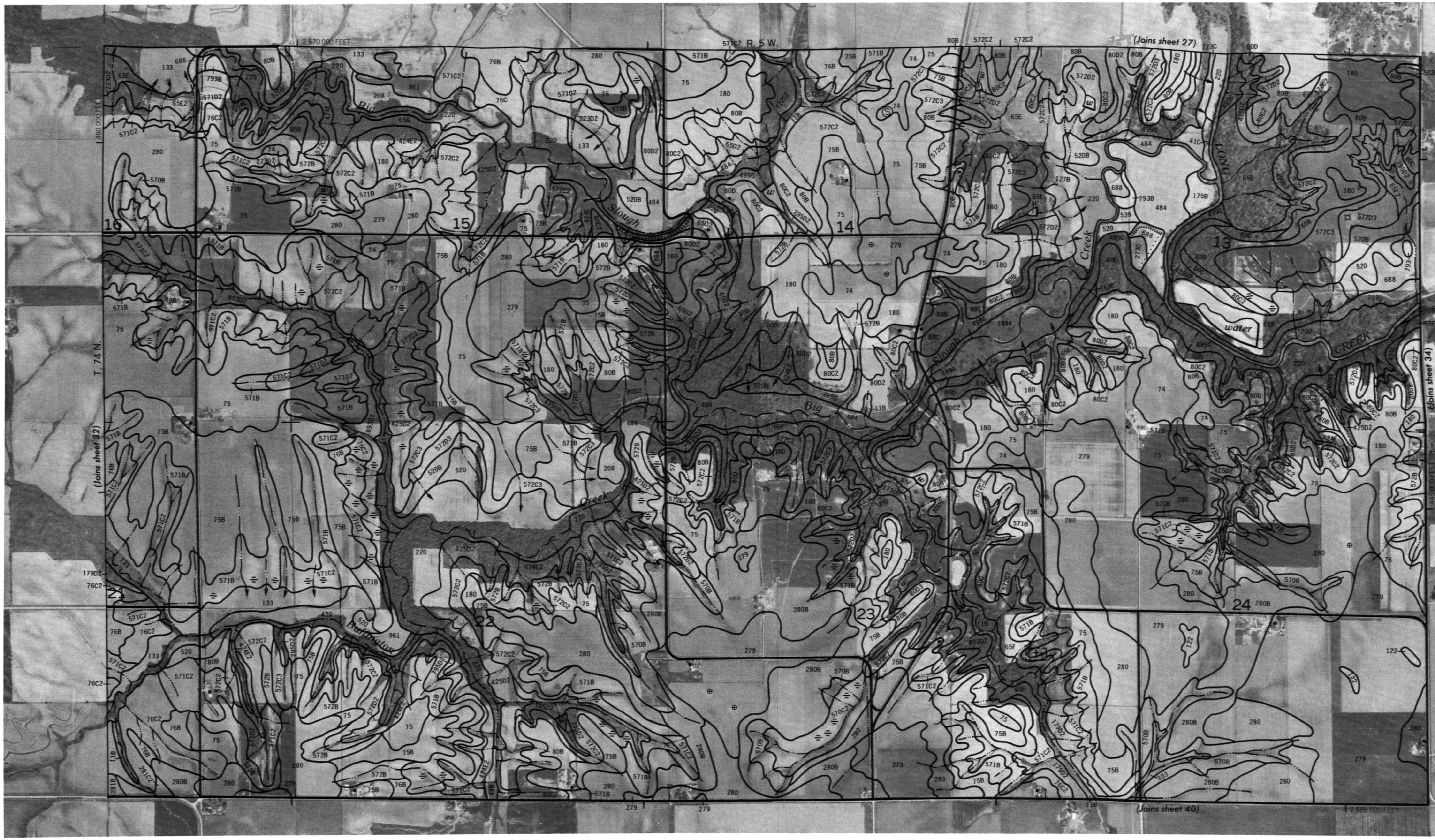
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

33

N

LOUISA COUNTY, IOWA NO. 33

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



Scale 1:15 840

1 Mile
¾
½
¼
0

5 000 Feet
4 000
3 000
2 000
1 000
0
5 000

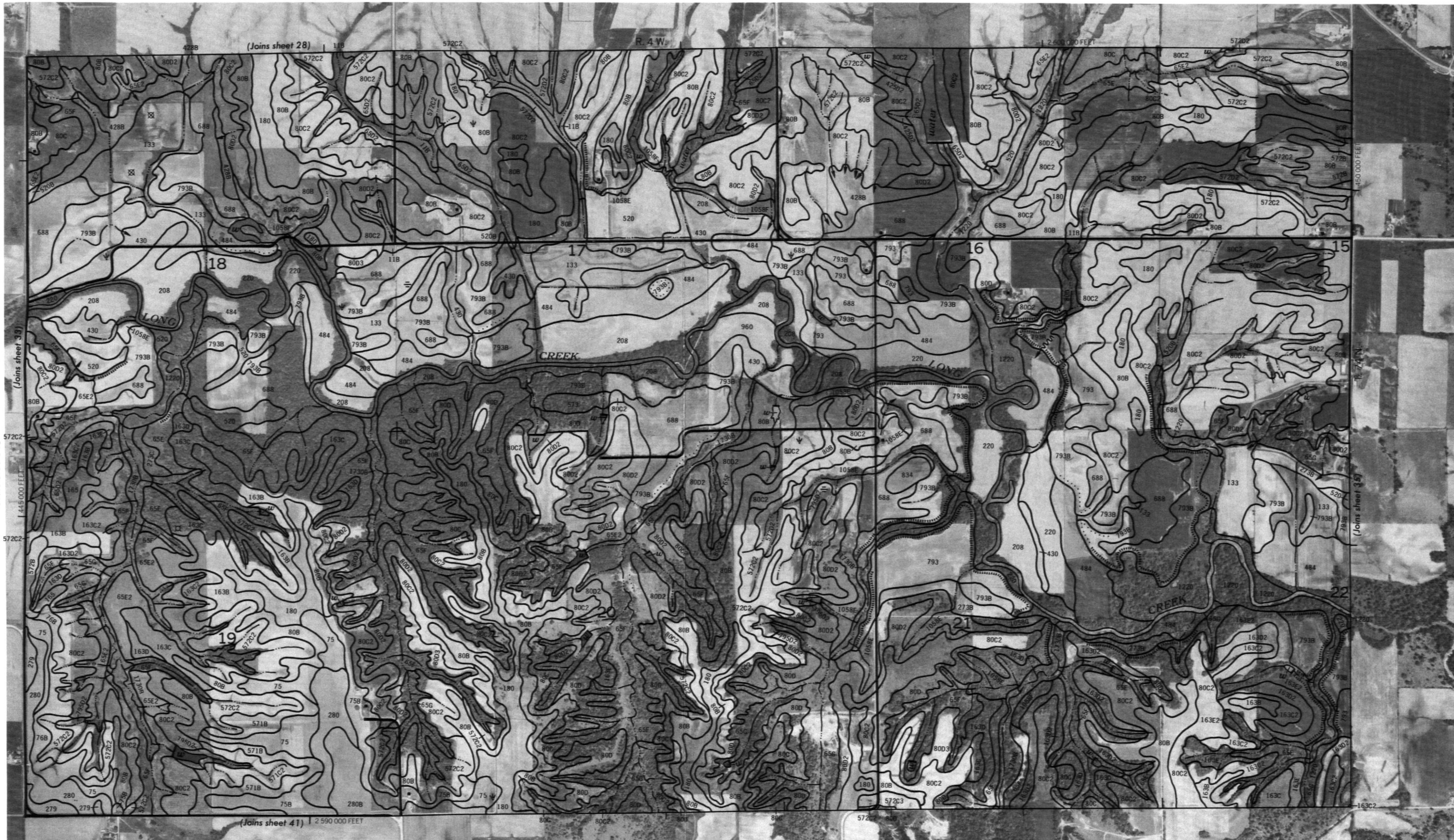
N

1 Mile — 5 000 Feet

Scale 1:15 840

0 — 1000 — 2000 — 3000 — 4000 — 5000

0 — ¼ — ½ — ¾ — 1



This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 35

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

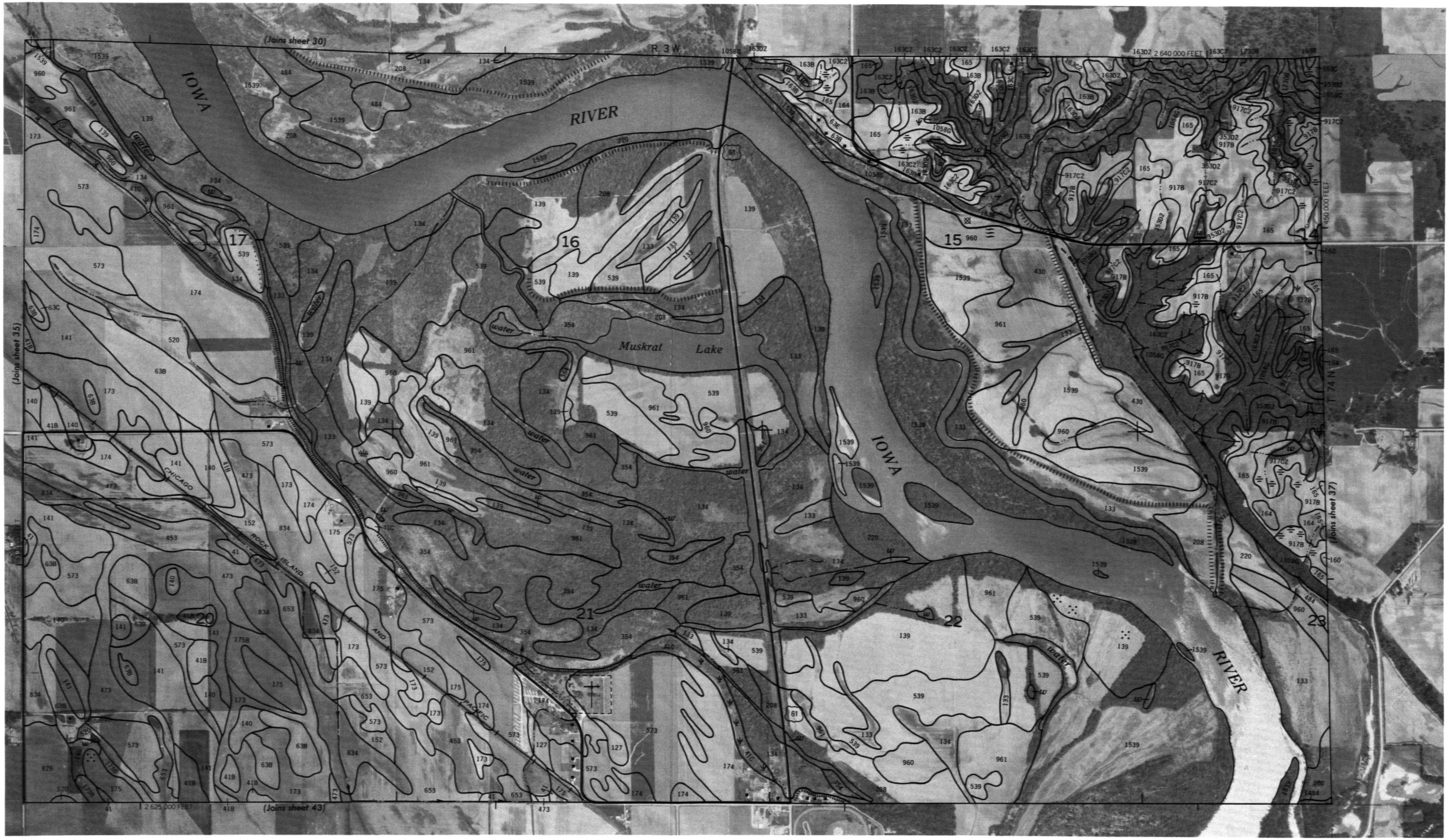
1 Mile

5 000 Feet

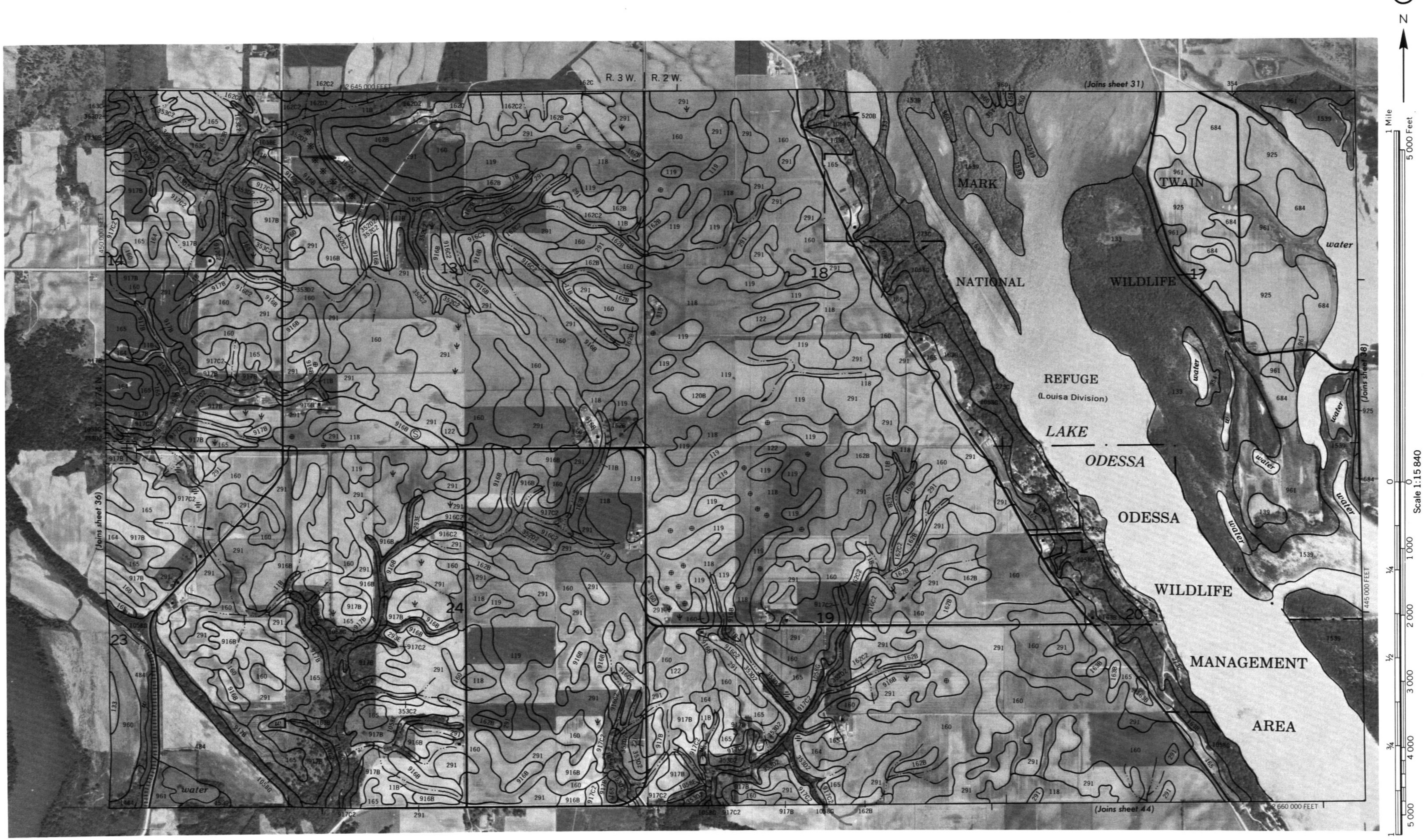
Scale 1:15 840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

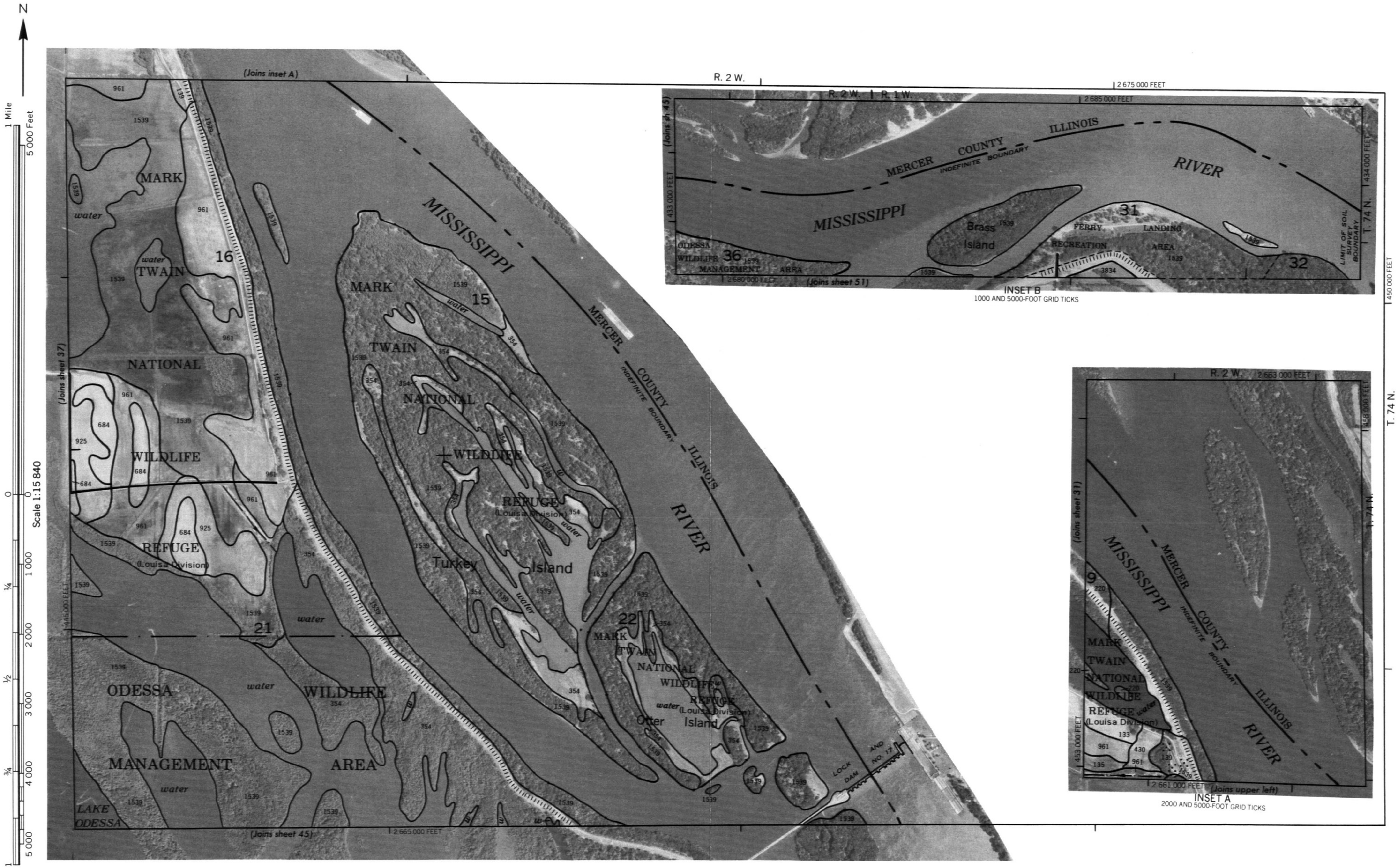


This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



LOUISA COUNTY, IOWA NO. 37

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

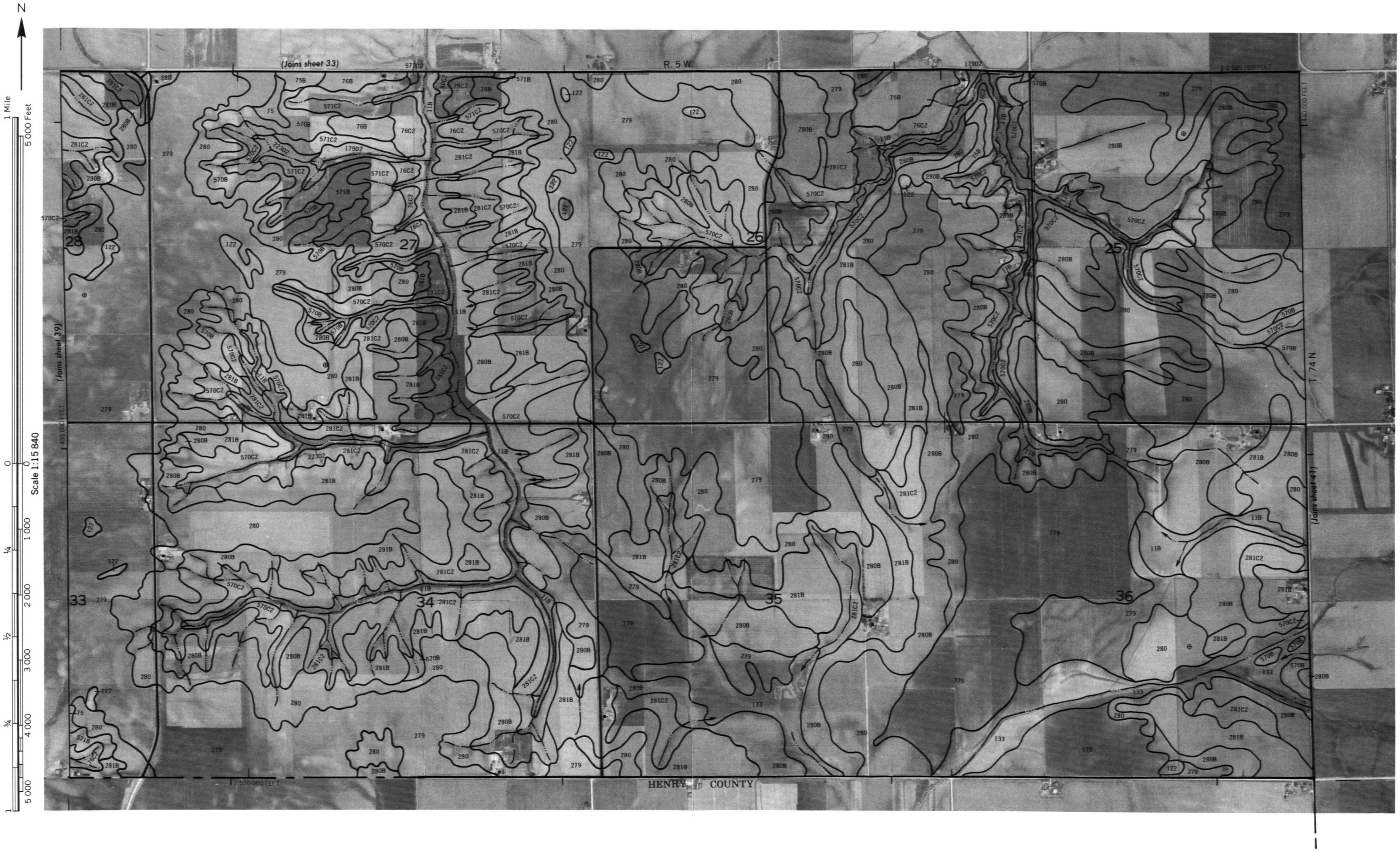


This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 39

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA — SHEET NUMBER 40

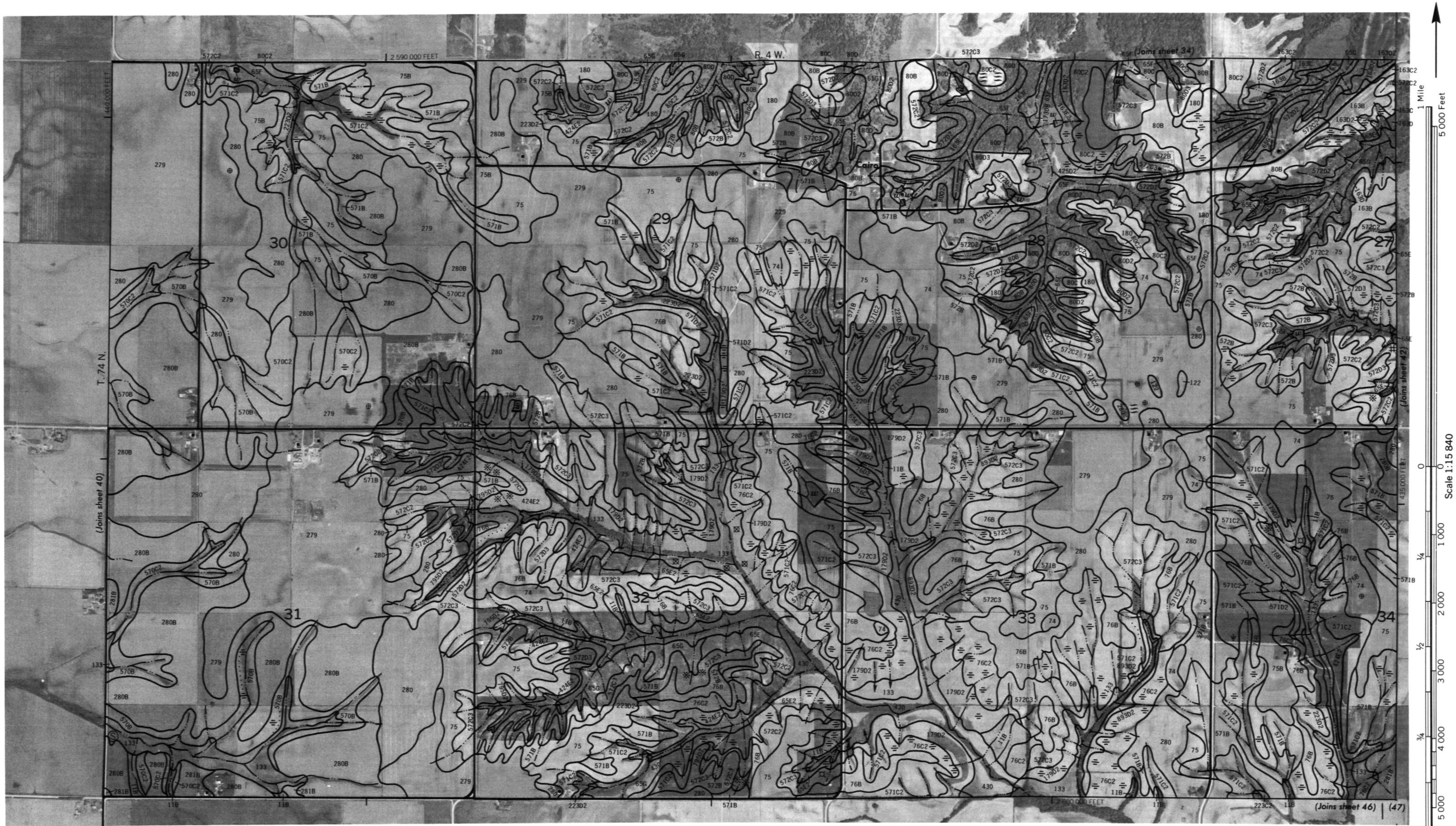


This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 40

LOUISA COUNTY, IOWA NO. 41

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



LOUISA COUNTY, IOWA — SHEET NUMBER 42

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 42

LOUISA COUNTY, IOWA NO. 43

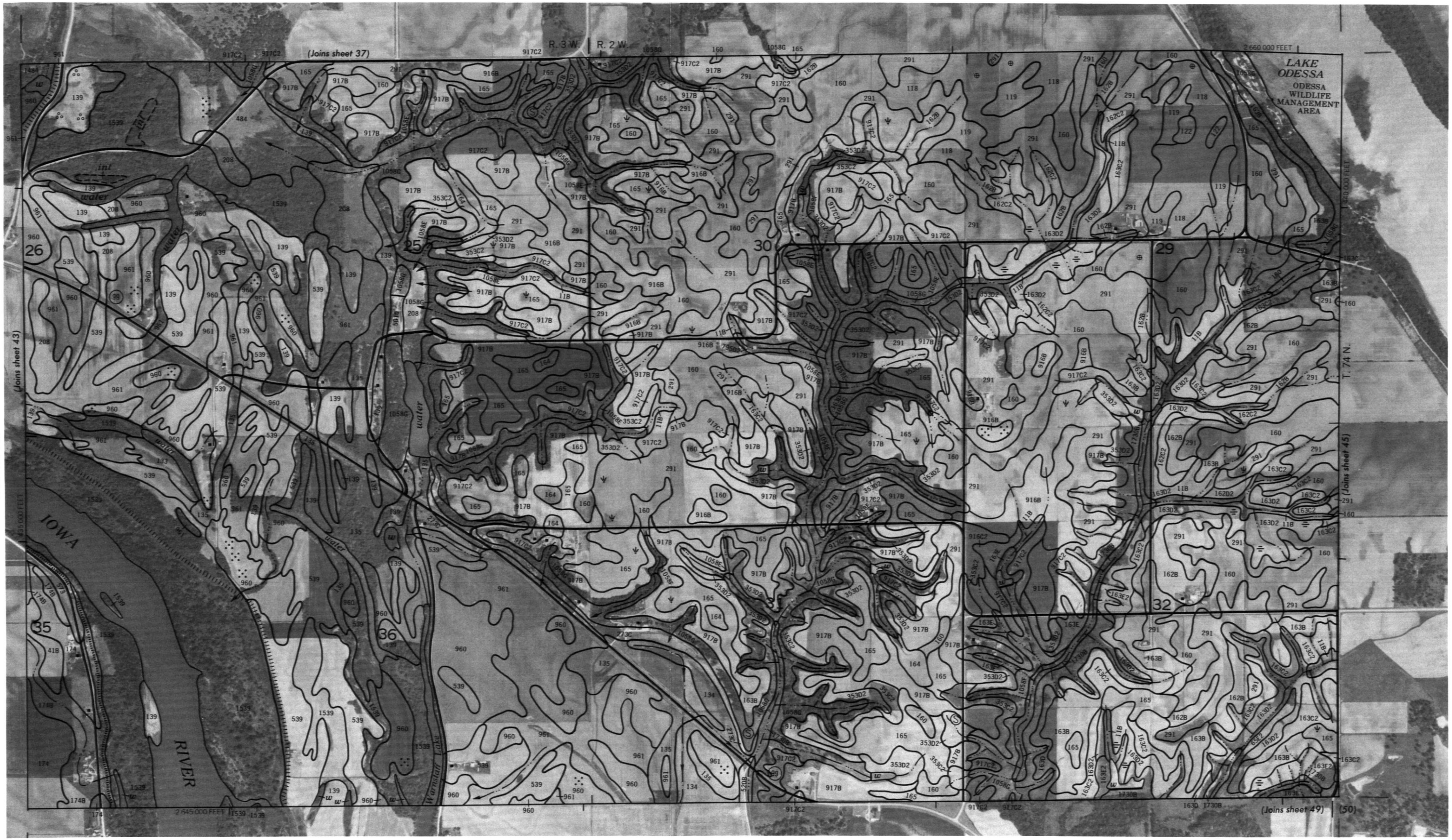
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

1 Mile

5 000 Feet

Scale 1:15 840



This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 45

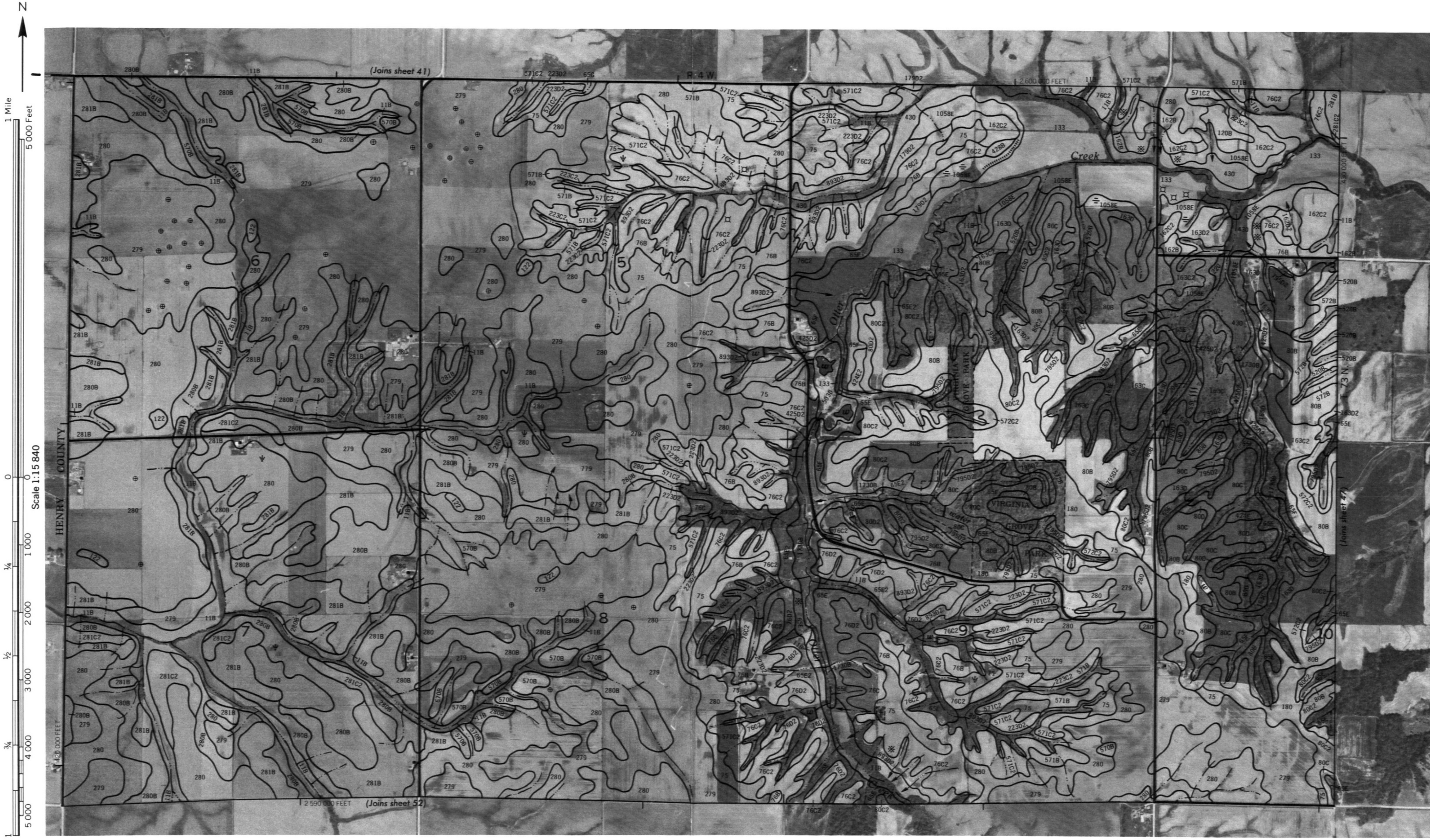
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

Scale 1:15 840

1 Mile

5 000 Feet



This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 46

LOUISA COUNTY, IOWA NO. 47

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 49

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

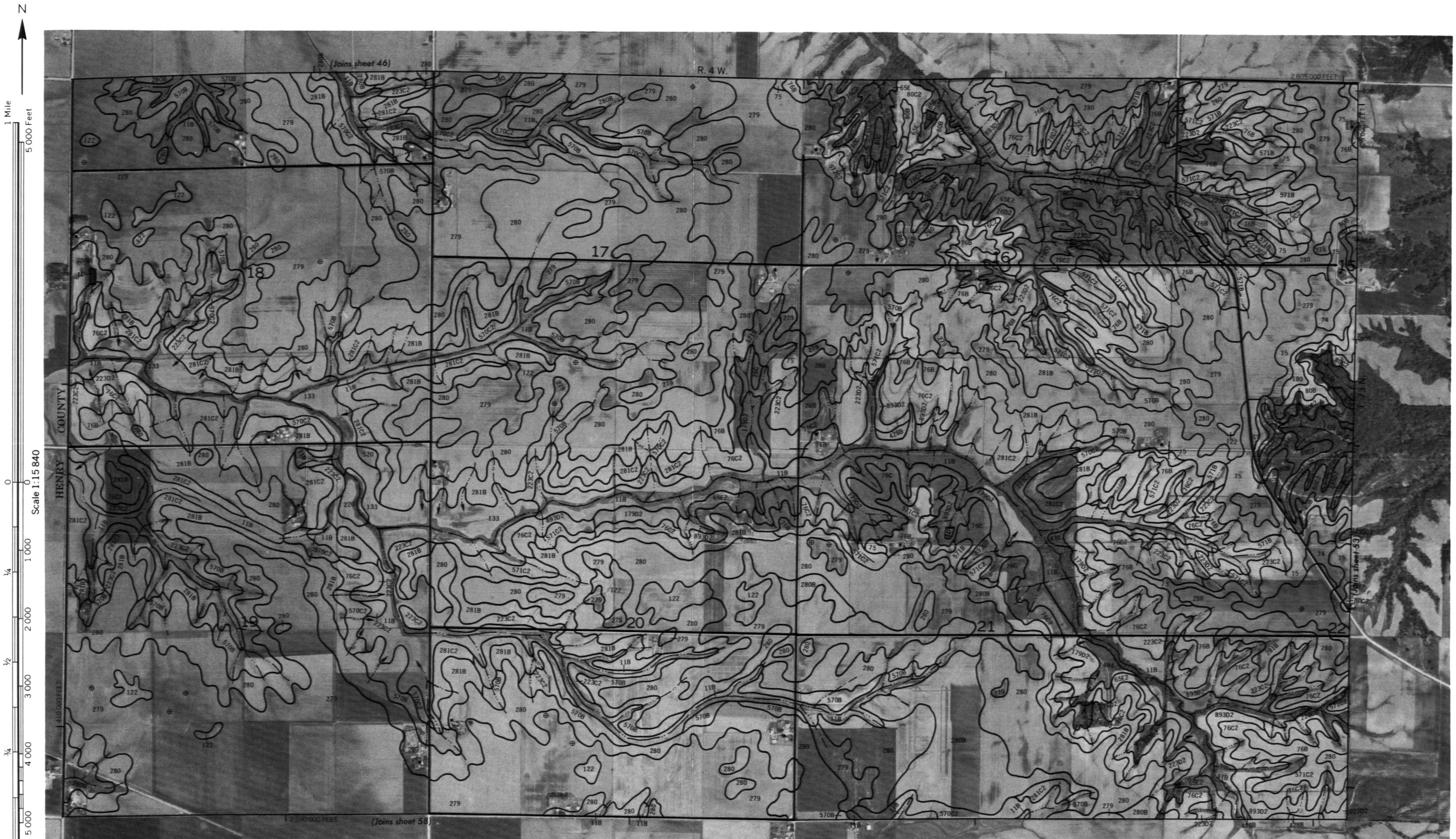
N

1 Mile
5 000 Feet
Scale 1:15 840
0
1000
2000
3000
4000
5000 Feet
0
¼
½
¾
1 Mile

LOUISA COUNTY, IOWA NO. 51

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA — SHEET NUMBER 52



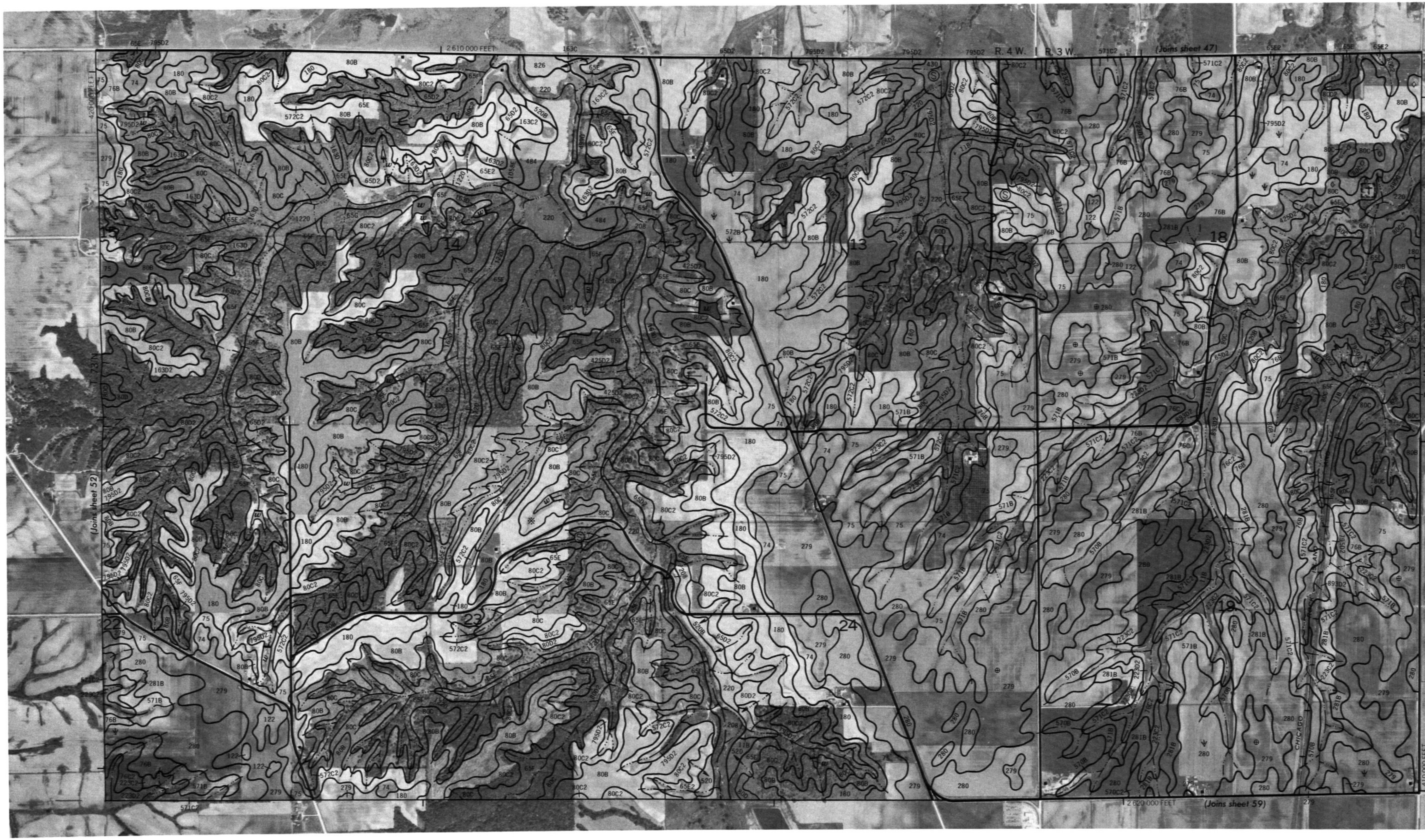
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 52

N

LOUISA COUNTY, IOWA NO. 53

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



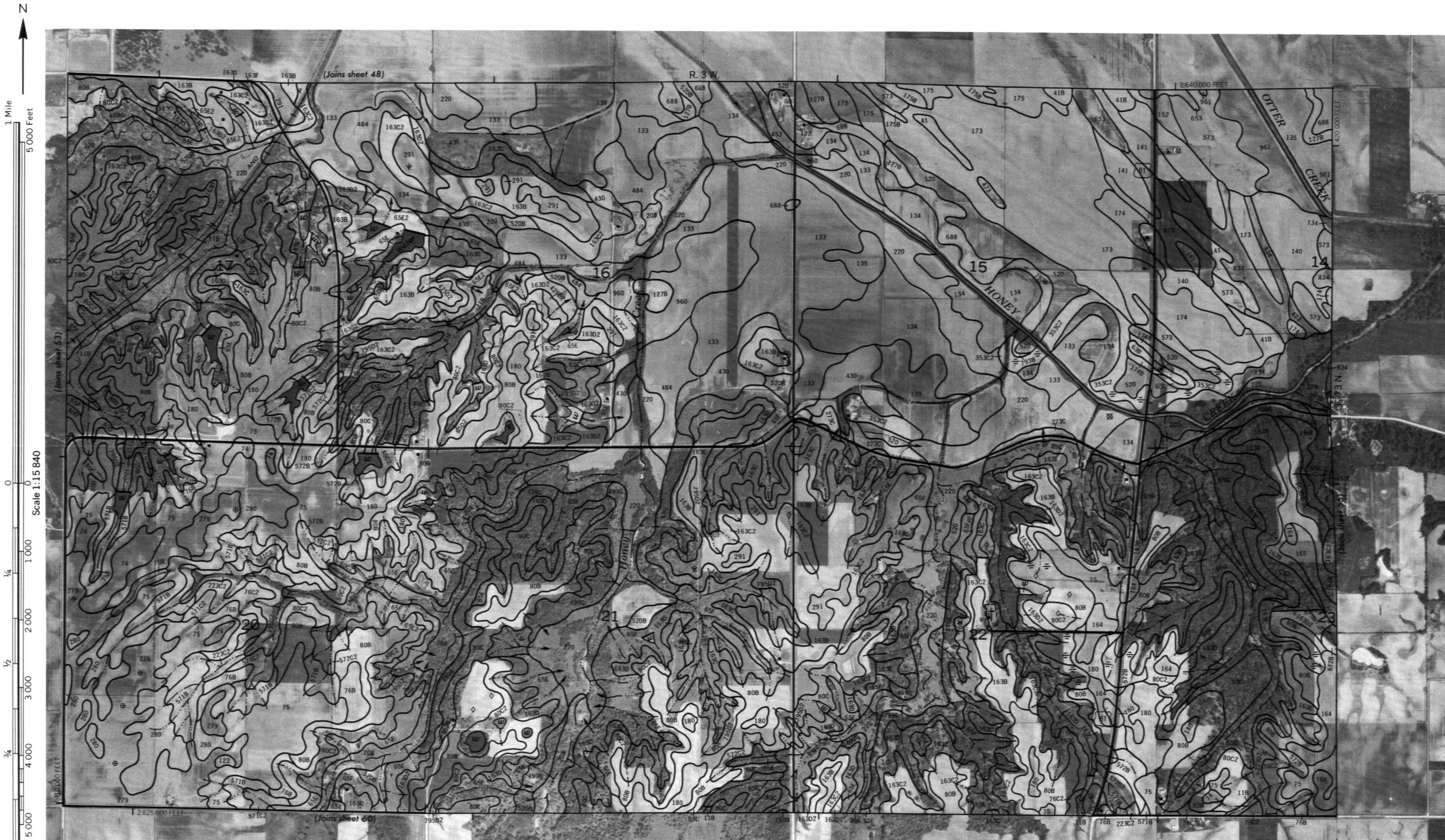
1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000



This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(55)

N

LOUISA COUNTY, IOWA NO. 55

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

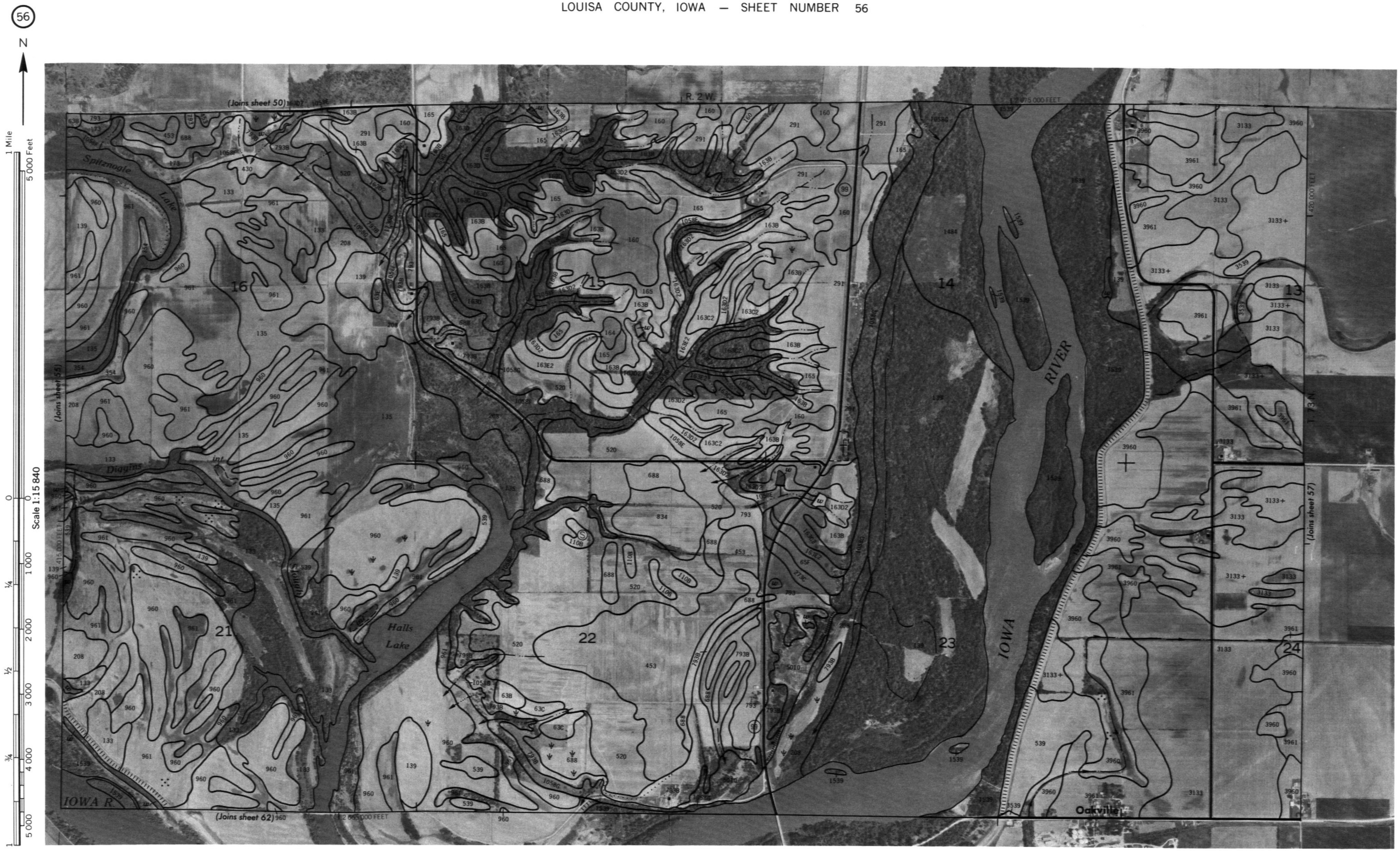
1 Mile

5 000 Feet

Scale 1:15 840

0 1 000 2 000 3 000 4 000 5 000

0 ¼ ½ ¾ 1



This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

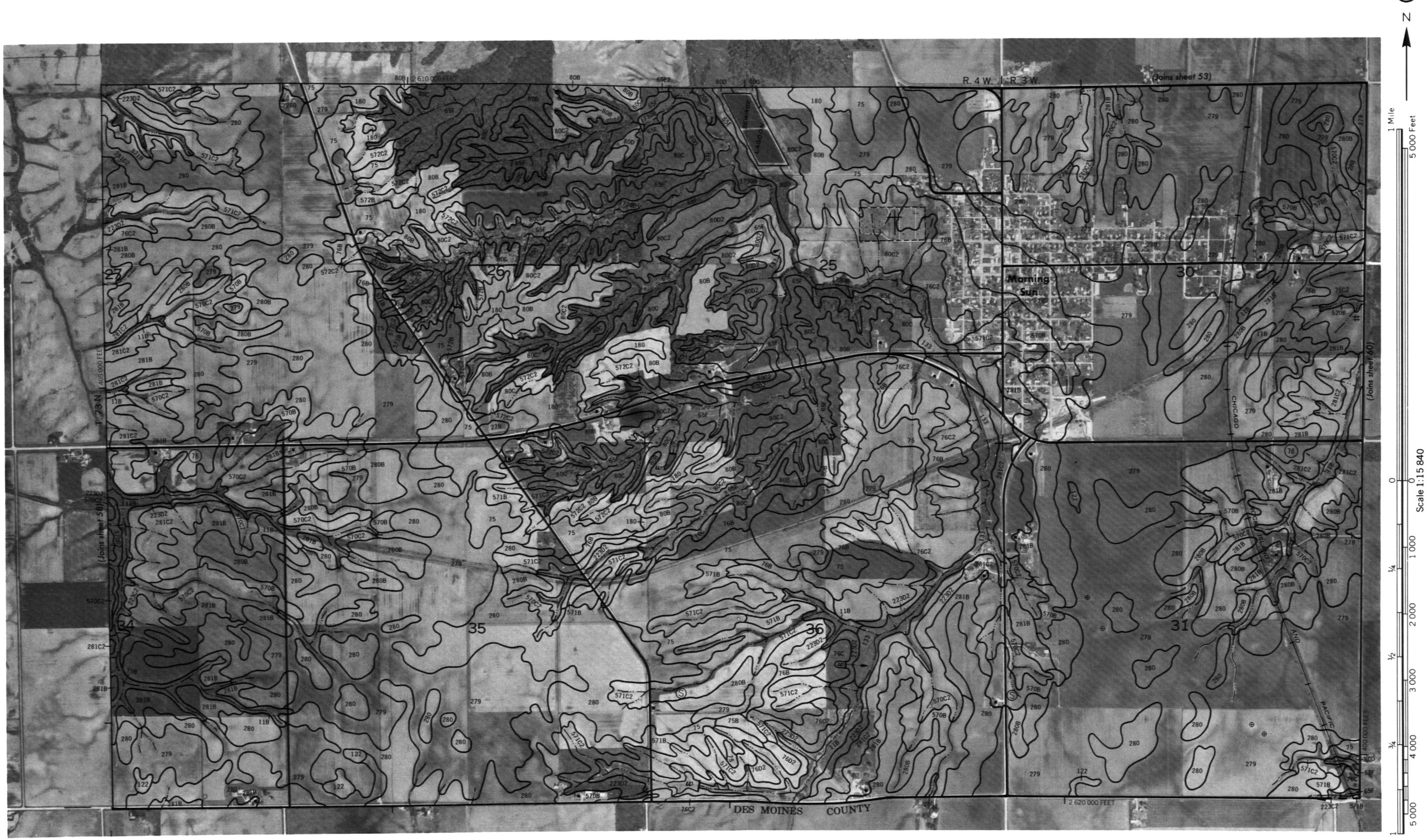
57

LOUISA COUNTY, IOWA NO. 57

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

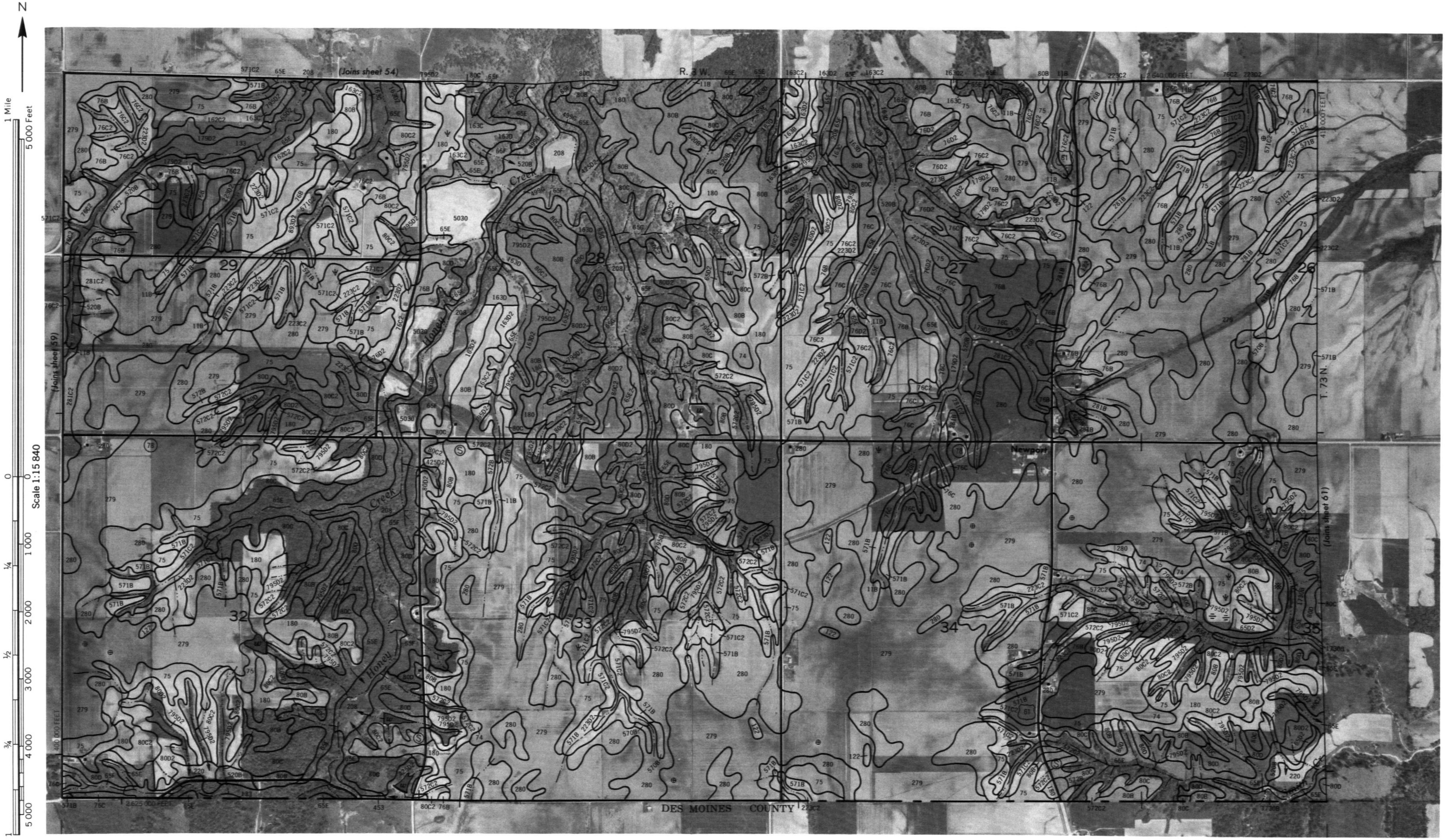
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 58



LOUISA COUNTY, IOWA NO. 59

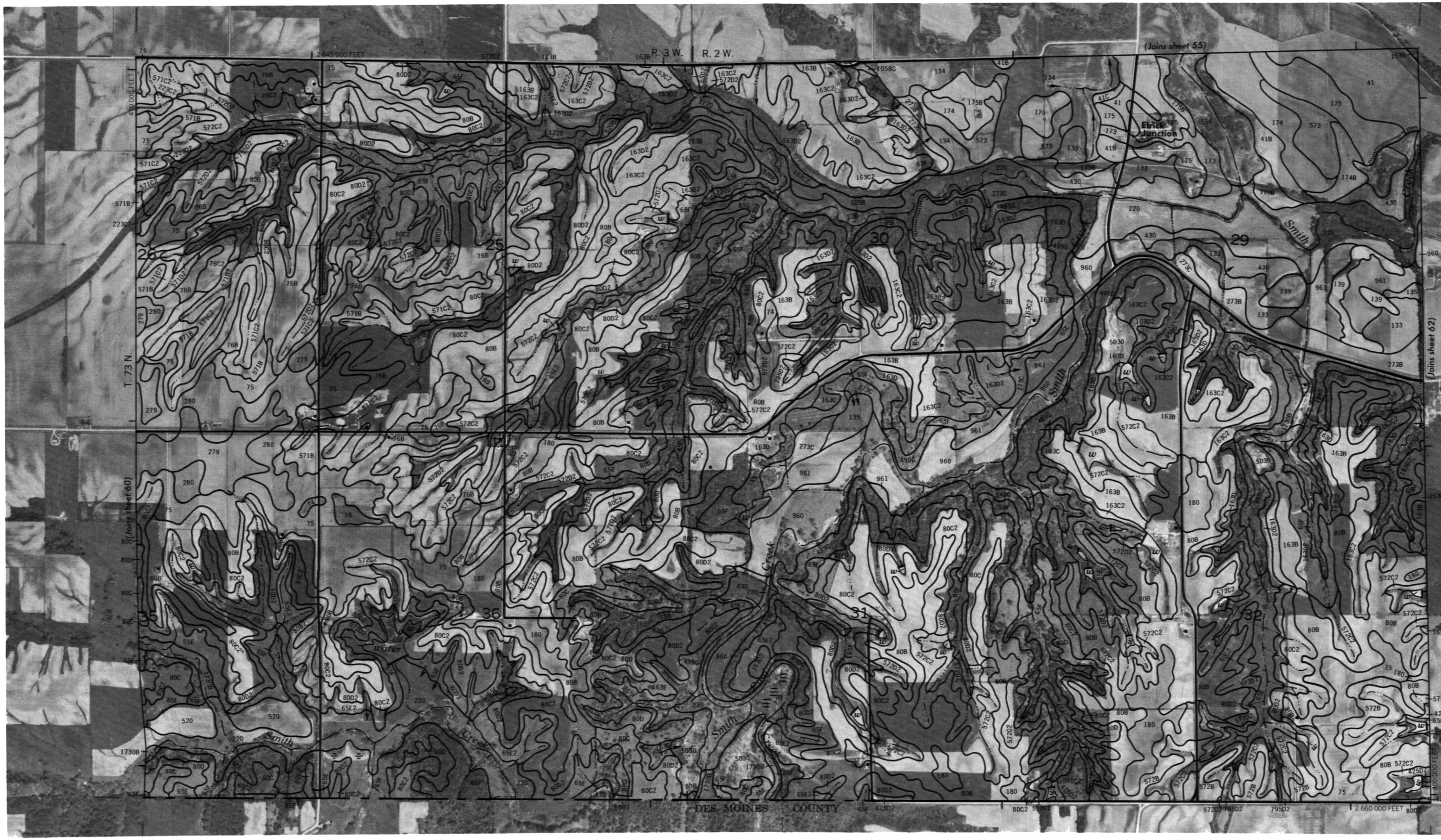
This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

LOUISA COUNTY, IOWA NO. 61

This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



N

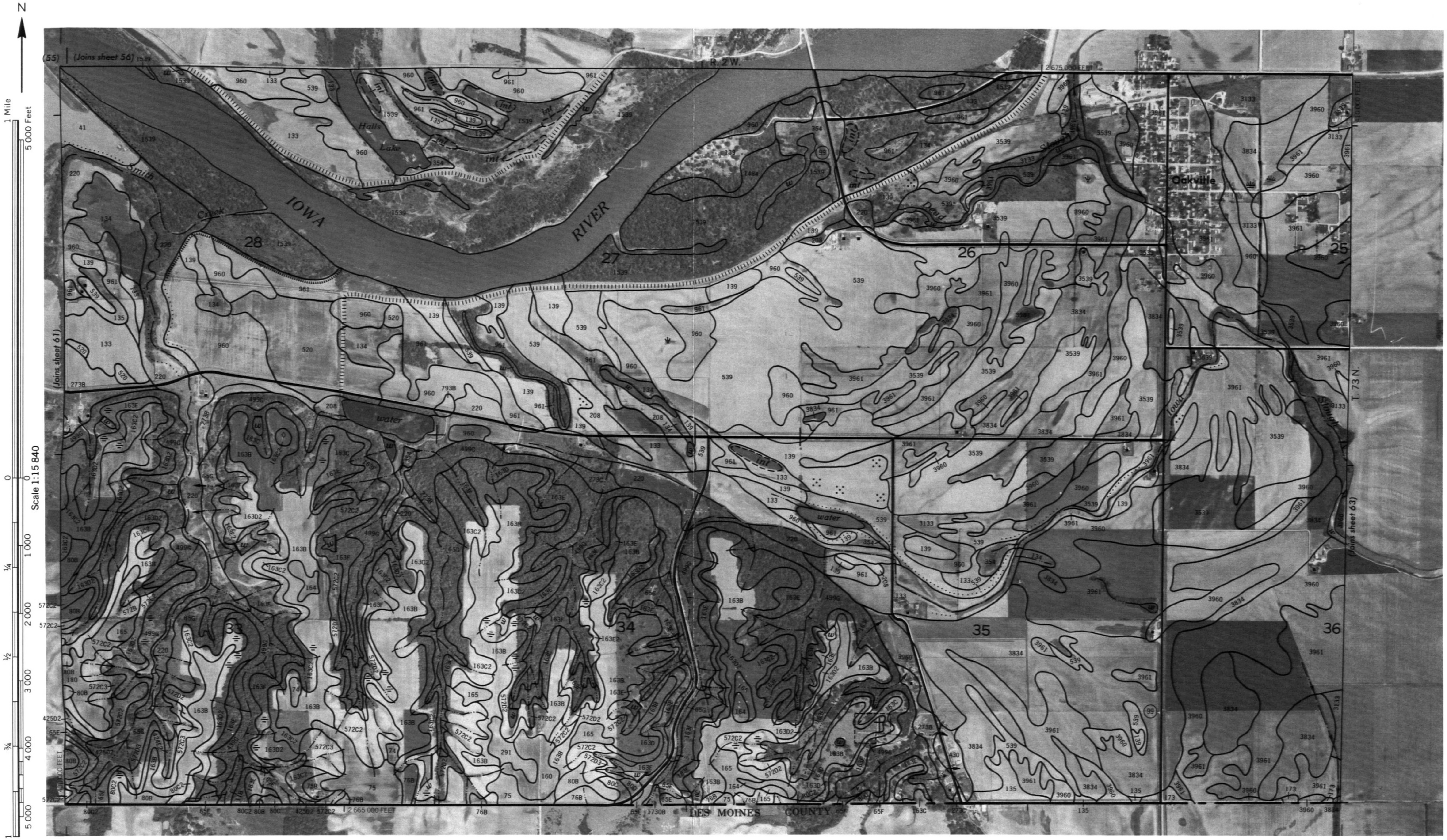
1 Mile

5 000 Feet

Scale 1:15 840

0 — ¼ — ½ — ¾ — 1

0 — 1 000 — 2 000 — 3 000 — 4 000 — 5 000



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